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ABSTRACT

The collection of eight conference papers on problems of auditory, visual, and speech handicaps begins with a review of what is known about deaf-blind children and early development. Following papers are devoted to spontaneous vocalization and babbling in aurally handicapped infants, psychological synergism (an approach to consideration of problems of the hearing handicapped retarded), prediction of recovery from stuttering, and print reading for visually impaired children. The final three papers report studies investigating auditory discrimination performance as a function of nonstandard dialect, visual sequential memory in good and poor readers, and auditory-visual integration. (KW)

Exceptional Children Conference Papers:

Problems of Auditory, Visual, and Speech Impairments

Papers Presented at the

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WHAT WE KNOW ABOUT DEAF-BLIND CHILDREN AND EARLY DEVELOPMENT

by

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Early development is a process of adaptation to the tangible and intangible environment. The young child learns adaptive behaviors through systems of gathering information and accumulating this information. The child learns to adapt to his environment through physical, mental, social, and emotional systems of behavior. These systems provide the means by which the child may learn of his internal needs and requirements as well as his environmental needs and requirements. These systems of behavior are, for the most part, observable. It is from observing these systems of behavior that information regarding the early development of the child may be measured or inferred.

What cannot be observed are the ways in which stimulation is brought into the child's developmental framework and how the child attaches meaning to these stimuli. This is simply stating that we cannot go into the "black box" of the mind of the child and be sure of what has been learned and what value has been placed upon

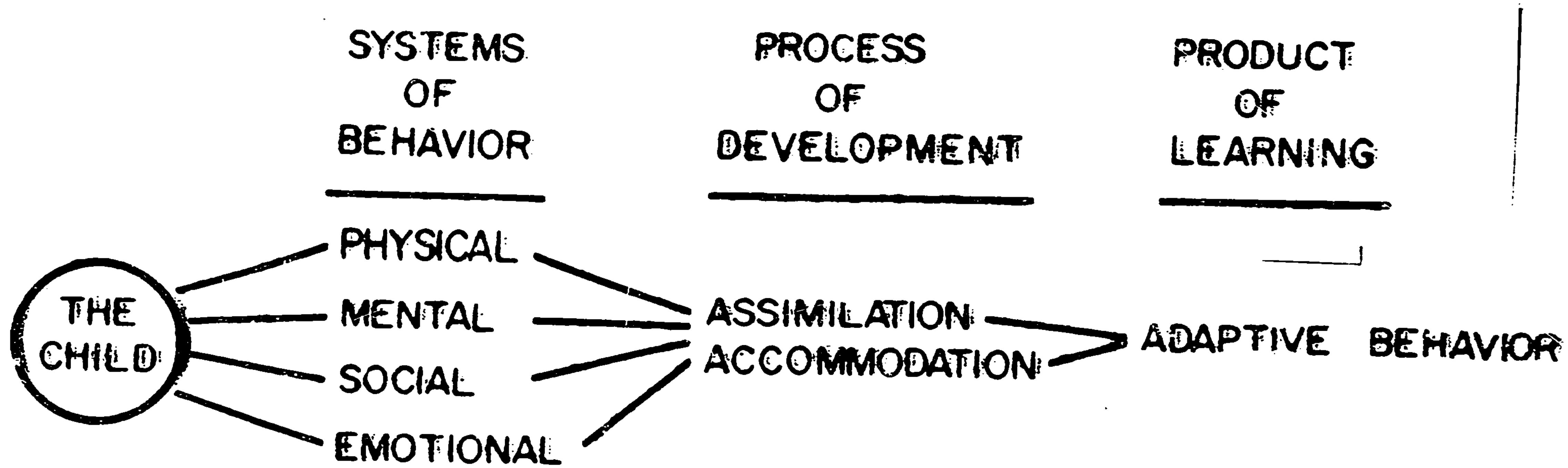
Paper presented at the 50th Annual Convention, Council for Exceptional Children, Washington, D.C., March 22, 1972.

experiences and sensations. However, in observing the systems of behavior, it is possible to indirectly observe the assimilation and accommodation which has occurred in each system. It is possible to recognize that new experiences are brought in through sensory channels and compared, contrasted, and evaluated to old experiences. This is the assimilation process. It is possible to observe how the child takes old experiences and sensations, and matches, evaluates, and integrates these into new happenings. This is the accommodation process of learning. Figure 1 presents a framework in which adaptive behavior in the child is presented as a process of assimilation and accommodation through systems of behavior found in all children.

The child develops systems of behavior in order to exert control over his environment. Without this development, he is constantly at the mercy of whatever is going on about him and cannot change, modify, or resolve the effects of incoming stimulation. To provide educational services which are appropriate to the young deaf-blind child, programs must be designed which center on the systems of behavior which the child must develop to cope with the environment. To illustrate this systems approach, I would like to show a video tape of some of the very young deaf-blind children in the program at the Callier Hearing and Speech Center, Dallas, Texas.

Figure 1

SYSTEMS APPROACH TO PROGRAM DEVELOPMENT OF EDUCATIONAL SERVICES FOR DEAF - BLIND CHILDREN



*Paper presented at the 50th Convention, Council for Exceptional Children, Washington, D.C. March 22, 1972.

Narrative of video tape # 1

These children range in age from seven months to the end of the second year of age. The first child in the series is a post meningitis 13 month old boy. He was evaluated for possible hearing loss at Callier Hearing and Speech Center and seems to have a profound hearing loss (perhaps in the 90 to 100 decibel range). He has been diagnosed as being cortically blind. He had normal development until nine months of age when he ran a high fever and was hospitalized with meningitis. What fascinates me about this child is that although he does not seem to react when I walk from a lighted room to a darkened room, when I hold his bottle about an inch from his face, he reaches for it with his left hand. He was talking a little before his fever, now he is a very quiet child. He walked before the fever, he is not walking now. His right arm seems to hang loosely from his body.

The second child was 2 years of age when these tapes were made. He is a post rubella child, has a mild hearing loss (35-40 db range) and he had bilateral cataract surgery. He wears contact lenses, but has recently been switched to glasses.

This next child was seven months of age when this tape was made. He had a cataract in his right eye which has been removed. He wears contact lenses all his waking hours. The left eye has retinal damage, but vision seems to be functional. He has a 60 to 75 decibel loss, bilaterally.

Here is the little boy we saw in the swimming pool with another deaf-blind child of the same age. The second child has a severe hearing loss and bilateral cataracts. We have had trouble in getting this child into the program because he is in a foster home and there is not staff to bring him to school.

The next child was nearing three years of age when this tape was made. He has an 80-85 decibel loss, bilaterally, but with amplification he responds in the 40-50 decibel range. He has had cataracts removed from both eyes and has a nystagmic action in his eyes. With his glasses, he seems to be able to see in the 20/200 range.

This little girl was a year and a half of age when this tape was made. She seems to have a 60-70 decibel loss, bilaterally. She has had cataracts removed in both eyes and now has glaucoma in the right eye.

This child was two years of age when this tape was made. He seems to hear in the 55-70 decibel range, he has had cataracts removed bilaterally, has light perception in the right eye and no light perception in the left eye. As you can see from the tape, this child is not walking. He did not walk until about four years of age. The children you have just seen are fairly representative of the population of congenital deaf and blind children.

Process of Program Development

The process of program development begins with observation of the child-- whether this is done through formal assessment procedures by psychologists, medical specialists, audiologists, or informally by teachers and/or parents. Program development begins with the basic question of what does this child need in the way of appropriate educational services?

To answer this question, the observations made by the staff served as a baseline of information on each child. Further information was requested in those areas of function where the staff felt they did not have a clear picture of the child's behavior. Once the baseline observations had been made, a problem solving approach was taken for each system of behavior on each child. The format for problem solving followed the steps of defining the problem, suggesting all possible answers, selection of one alternative, applying this alternative, and evaluating the system of behavior for changes. If the changes were positive, then the teaching staff applied further use of the alternative to build the behavior system.

At this point, it should be mentioned that problem solving approaches do not begin at the skills level. The teachers had to begin intervention far below the skills level which they eventually wanted and expected to attain. This meant that such questions had to be asked as:

> What sensory inputs relate to this behavior?
>
> What neurological maturity is required to respond to these sensory data?
>
> What compensatory behaviors must the child develop before the performance of a skill can have generalized meaning for the child?

Each system of behavior was reviewed using Wepman's model (1969,326) of central nervous system function. This model centers on a basic reflex level of sensory input, motor output. If the sensory arc is present, the second level of organization is possible as sensory data are shunted to the perceptual level. This second level includes perceptual input. Output of organization is observed through imitative behavior. Concept formation is possible as sensory and perceptual information is passed to a third level. At this level, the input of data, generalized from the environment's stimulation of sensory and perceptual channels, is analyzed by the child and synthesized into some meaningful pattern. Output is assessed by thought processes, values, and actions calling upon the two previous levels of output (motor response and imitative behavior) and upon the use of prior patterns of behavior which the child may call (or recall) upon.

An illustration of the analysis of a system of behavior may be made using the social system of behavior. Socialization in young children may be viewed from the aspect of play. The first level is isolated play where the child interacts with objects or people egocentrically. This play in isolation allows the child to explore and gain sensory inputs as to the nature of the world about him. For the sensorially impaired child, socialization may perseverate at the isolated play level with self stimulatory activities. Intervention at this point should help the child learn to perceive data and learn to respond to various sensations in some organized manner.

From isolated play, the socialization system of behavior develops parallel play activities. At this level, the child participates in similar activities as other children but is not necessarily concerned with the behavior of other children. They may be doing the same things but do not acknowledge each other. Interactive play emerges as the child relates more to agemates. One demonstration of interactive play with deaf-blind children may be found in Jan Van Dijk's use (1968) of co-active exercises. In this level of play, children cannot accomplish the activity without the assistance and cooperation of another child.

Each system of behavior was analyzed from the sensorimotor, perceptual, and concept level of function. From the baseline data viewed in this framework, intervention was planned. I would like to show a second video tape which illustrates the outcome of these interventions based upon systems of behavior.

Narrative of second video tape

These passive exercises with deaf-blind children are out attempts to help the child develop body image - or to sense and percieve where various parts of the body are located and to feel the movement of these body parts. Note that language is paired with movement. Even though these children are deaf or hearing impaired, we give them language clues through the auditory channel at all times.

Do you remember these children from the tapes made in the summer of 1971? When we saw the children at that time, they were passive or lacked observable behaviors which indicated what meaning they placed on experiences. Some of them did not want us to intervene into their lives. Some did not seem to know how to organize sensory data. Some seemed to be in their own world and unable to relate to the environment. Notice that they are now more responsive to others and to what is going on about them. They are being encouraged to use residual hearing and vision, in fact, those very young children who had cataract surgery at five or six months of age seem to be visual learners even though they are medically and legally blind. Notice how they seem to respond to sound, how they vocalize, even a tantrum includes squeals and crying. These are the kinds of behavior that tell us that the child is learning, is assimilating and can learn to accommodate to inputs. Listen to this little boy. He was the little seven month old when we saw him before. Now he is 20 months of age, in this tape sequence he is saying " -ryan" when his mother calls his name, Bryan. He senses the auditory clue, he perceives it as meaning something, and he has an emerging concept that this particular sound means for him , as a person, to attend, respond, react. We cannot measure assimilation of information, but actions such as this indicate that it is there and that the child is learning. If we had not documented the baseline of systems of behavior, we would not be able to show that a child can progress. We could not show how this progress occurs or the outcome of it. That is why a systematic approach is so important. It tells you, as a teacher, where you begin and where you and the child are at the present. Not only does it tell you where you have been, but also it tells you where you are going.

What are deaf-blind children telling us? They seem to be telling us that they are first of all children. They seem to be telling us that they are developing in their early years similarly to other children, but observations indicate that this development is fragmented. They also seem to be telling us that programming for the young child who is deaf and blind must first address itself to aiding the child in the organization of behavior. From this start we can progress to skills development, concept formulation, and hopefully formal learning. Deaf-blind children can move from total dependency to levels of independent living. Our challenge is to find a way to learn to listen to what deaf-blind children are telling us in such a way that programming helps them move toward independence.

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SPONTANEOUS VOCALIZATION AND BABBLING IN HEARING IMPAIRED INFANTS

The development of language, a unique dimension of human behavior, has been studied from many aspects: syntax, cognition, morphology, history, and biology, each of which makes a significant contribution to the communicative process. In the challenging spirit of the age of space exploration, scientists have studied intriguing facets of linguistic theory: the child's generation of grammar (Chomsky), biological activity in the communicative system (Chase, Lenneberg), and contrasts in early phonological development (Weir)[1]. As yet, there is little research available in the latter. Further examination of phonological development promises a better understanding of the manner in which a child develops his language system.

Verbal communication develops in the exchange of acoustic information between the adult model and the infant. The normally hearing infant progresses through a series of prelingual, overlapping levels of production of sounds before he can use oral language in the symbolical sense. The roots of linguistic growth include early vocalization and babbling. From the birth cry forward, nearly every child, whether normally hearing or not, will utter sounds in reaction, first, to his own state of discomfort, and later to his state of comfort. The step, mentioned by nearly all writers as the one following early vocalization,

[1]N. Chomsky, "On the Notion 'Rule of Grammar'", The Structure of Language, eds. J. A. Fodor and J. Katz (Englewood Cliffs: Prentice-Hall, Inc., 1965) pp. 119-137; R. L. Chase, "Evolutionary Aspects of Language Development and Function", The Genesis of Language, eds. F. Smith and G. A. Miller (Cambridge: The M.I.T. Press, 1967), pp. 253-269; E. Lenneberg, "The Natural History of Language", The Genesis of Language, eds. F. Smith and G. A. Miller (Cambridge: The M.I.T. Press, 1967), pp. 219-252; R. Weir, "Some Questions on the Child's Learning of Phonology", The Genesis of Language, eds. F. Smith and G.A. Miller (Cambridge The M.I.T. Press, 1967) pp. 153-168. 12

is the babbling stage, which commences between the sixth week and the sixteenth week of life.[1]

The primary purpose of the study was to determine if hearing impaired infants in the process of linguistic development pass through a period of babbling during which phonological activity occurs. To obtain this information, it was necessary to record samples of the vocal emissions ofthe hearing impaired subjects over a period of time, considered to be for normals, beginning at approximately three to four months of age and continuing through the sixth or seventh month. The specific questions to which the study was addressed were the following:

1. Do hearing impaired infants babble?
2. If so, does it diminish, plateau, or increase between three months and six months of age?
3. What are the types of sounds occurring in the babbling of hearing impaired infants?
4. What is the frequency of sounds occurring?
5. What vocalizations do these infants make?

Selection of Subjects

To obtain infants with hearing loss identified by the fourth month of life required the cooperation of a number of agencies. Letters of inquiry were directed to hospitals, schools for the deaf, associations for the hard of hearing, and clubs for the deaf in the metropolitan areas on the east coast of the United States.

Three subjects were located who met the following criteria:

a. Chronological age: prior to 16 weeks of age

[1]M. Lewis, Language, Thought, and Personality in Infancy and Childhood, (New York: Basic Books, Inc., Publishers, 1963), p. 20: D. McCarthy, "Language Development in Children", Manual of Child Psychology, ed. L. Carmichael (New York: John Wiley & Sons, Inc., 1946), pp. 482-483, 492.

b. Age of onset of deafness: at birth

c. Audiometric evaluation: classified as hearing impaired according to recognized audiometric evaluation of infants

d. No other diagnoses neurological or physiological dysfuntions: according to recognized neurological evaluation of infants.

In addition and importantly, the parents of the subjects had to agree neither to use a hearing aid or an auditory training unit throughout the study nor to engage in any program of parent education offered by local schools, clubs, or other associations. These limitations thus reduced the problem of yielding information which could be meaningfully interpreted in the light of the five questions in this study.

The three subjects selected are designated for consistency in the study as Infant ○ , Infant □ , and Infant △ . Evaluations of the hearing of each infant were made by qualified audiologists in established audiology clinics in the metropolitan area. Infant ○ was 12 weeks of age at the initiation of the study. Using sound field testing procedures, response to auditory stimuli of 80 dB intensity at 500Hz were elicited. Infant □ , evaluated at 16 weeks of age, showed a response to pure tone stimuli of 500Hz presented at 100 plus in sound field. At 12 weeks of age, Infant △ responded to pure tone stimuli under earphones at 1000Hz at intensity levels of 70 dB on the right eary and 80 dB on the left. It appears that the etiology of hearing impaired of both Infant ○ and Infant □ is familiar. Infant △ appears to have a moderate to severe hearing loss incurred either as a result of maternal Rubella and/or association with diabetes on the maternal side.

In the pilot study, one hearing subject was used for purposes of refinement of techniques of recording and observation. While no threshold measurement of her auditory function was obtained, responses were obtained using familiar environmental sounds in sound field at levels indicating normal hearing.

In addition for purposes of comparing silence periods following the completion of the present study, this normally hearing infant was observed and vocalizations, babbling, and silence periods recorded when she was thirty-six weeks of age. Results of these observations are reported as Infant X.[1]

Techniques of Recording

To obtain samples of the vocalization and babbling of hearing impaired infants this investigator selected time samplings of vocal behavior for twelve successive weeks as an appropriate technique. This insured adequate recording of the critical time period when babbling is reported to occur in the normally hearing infants.

Vocalization and babbling have been reported as taking place during periods of contentment and satiation. Consequently each infant was observed and his vocal emissions recorded for three thirty minute periods on a single day once weekly over the three-month period. These samplings, obtained within one=half hour of nourishment during the morning, around noon, and in the afternoon varied according to their schedule of feeding. The samples were taken at three different times of the day: morning, noon, and afternoon to present diachronic observations. Only the observer was in the room with the infant, out of the line of vision of the infant, but in a position to see the infant and record his facial expressions and body posture. An interview record was completed each sampling day in order to record any physical and/or social reactions that might have occured to contaminate the data observed

1 See Table 1. page

Instruments Developed

To transcribe the rich variety of sounds emitted by the subjects it was necessary to develop an original coding system. Twenty symbols were used to describe the vocalizations including such sounds as coughing, crying, whimpering, and sputtering. The sounds classified as "phonemes" were transcribed in the International Phonetic Alphabet. A broad phonemic transcription was used in this study since the interest was to record eht sounds emitted by three infants in the prelinguistic stage of babbling before the use of conventional language.

Definition of Terms

For the purpose of this study, babbling is defined as consisting of identifiable vowels and consonants according to the adult model of phonemic production. Vocalization is the emission of sounds, other than babbling, that is, not identifiable as phonemes, which can be classified as "grunt", "cry", "chuckle", and "whimper". Silence is the absence of any vocal production occuring during the timed samples exclusive of periods of sleep.

Equipment

The observations were recorded using a Sony Tapecorder, Model 200, AC powered portable at 7 3/4 instants per second speed for speech, and intensity between numbers 5 and 6 for normal recording level, with BASF (Badische Anilin and Soda-Fabrique) recording tape, LGS 26, 7"/2400'. The BASF tape was used because of its reported sensitivity in recording speech sounds. A high fidelity Sony microphone F-97 with low impedance was mounted on a portable 10 inch goose-neck stand and placed on a crib, 10 inches away from the mouth of the infant, at the back of the infant's head.

The Kay-Graph, number 6060A, was used for analysis of sample tapes. This provides a spectrum analysis of sound samplings secured previously on the Sony recorder.

Summary of Results

The most significant finding in this study is the fact that deaf infants do babble. Babbling was already occuring among the three hearing impaired subjects at the initiation of this investigation. It increases to a peak performance by the age of 23 weeks for Infant ○ 17 weeks for Infant □ , and 25 weeks for Infant △ . After this event a decrease in babbling appeared. There was an abrupt decline in babbling for Infant ○ at 24 weeks which was immediately after her peak performance, a steady and steep decline for Infant □ at 19 weeks and a sharp decline for Infant △ at 26 weeks of age.[1] Concomitant with the decrease in babbling was the increment of silence among the three subjects.

The babbling occured as single vowels, as single consonants, and as vowel consonant combinations in various patterns. While normally hearing infants display a steady increase of babbling, prior to the state of imitation, the hearing impaired subjects in this study showed a marked decline. However, before this decline the percentage of the vowels and consonants for each subject tended to increase with maturity in an erratic way. This was also true for the variety of vowels and consonants produced, which increased up to a certain age level and then declined due to a decreasein overall production of babbling.

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1 See figure 1, page [illegible]

Vowel production was consistently higher than consonant production for the three subjects. The front vowels /ɛ,æ,ɛ/ and the medial vowel /ʌ/ were expressed most frequently. The other medial vowels remained underdeveloped, while the back vowels increased slightly with maturity. Infant Δ was the most productive in vowel utterances. By the 24th week of age, she had emitted the vowels /ɛ, æ, ʌ, d, u, e, U/.

There was a paucity of consonant production among the three subjects in comparison to the production of normally hearing infants as reported in the literature. The velar /g / was the only consonant produced by the three subjects within the first 16 weeks of life. By the 24th week, /g, k, and d/ were emitted by the subjects. The phonemes /b,n, t, y, w, and m/ occured in the repertoires of individual subjects.

An analysis of variance on the frequency of occurrence according to type of phoneme produced by the three subjects indicated that the phoneme /ɛ/ was the most frequently produced.

Cumulative percentages of the frequency of the phonemes emitted by the subjects were computed. The most frequently used phoneme constituted 64% of the subjects' babbling at the 14th week of age and 26% at the 20th week of age. In the early weeks the five most frequently used phonemes contributed to 95% of the output; in the peak weeks, 82%, and in the final weeks, 94% of the total output. These results revealed the repetitive characteristic of early babbling.

Computation of the proportionate periods of babbling, vocalization, and silence revealed that the amount of babbling constituted the least portion of time, vocalization approximately 1/3 of the time, and silence the greatest amount of time.

The most favored vocalizations were crying with the phoneme /æ/, whimpering with the vowels /æ, and ɛ/ and other vocalizations such as coughing, grunting, and sputtering. Although the subjects emitted many vocalizations in common, such as crying and whimpering, they were individual in such vocalizations as sputtering, grunting, and chuckling.

A number of phonemes was produced during the whimpering period /dɛ, ɛdɛ, bʌ, nɛ /. These were heard later in the babbling. This finding indicates that early phonemes may emerge in the vocalizations before they appear in the babbling.

While the normally hearing infant increases his babbling (Table 1) of a single hearing infant contrasts sharply with the decrease in babbling in the hearing impaired subjects.

Implications

Implicit in the finding that babbling occured in the vocal emission of the three hearing impaired subjects is the need for early identification of hearing impairment. An early fitting of personal hearing aids, as well as a suitable auditory educational program, are likewise recommended. The subjects evidenced a paucity of type of phoneme production and failed to continue to increase their output of babbling at the distressingly young age of 17, 24, and 26 weeks. It is recommended that a system of education be developed to utilize this critical period in the process of the growth of oral language.

Table 1

Comparison of Percentage of Time Used in Vocalization Babbling, Silence, and Sleep at Specific Age Levels

Age in Weeks	Infant	Vocalization Minutes [1]	%	Babbling Minutes	%	Silence Minutes	%	Sleep Minutes	%
16	O	15.3	.51	2.1	.07	7.6	.25	5.0	.17
	□	13.5	.45	2.7	.09	13.8	.46	0.0	
	Δ	7.2	.24	.6	.02	21.2	.71	1.0	.03
	X	7.2	.24	6.1	.20	16.7	.56	0.0	
20	O	14.4	.48	1.5	.05	14.1	.47	0.0	
	□	9.0	.30	.6	.02	17.1	.57	3.3	.11
	Δ	6.9	.23	.6	.02	19.2	.64	3.3	.11
	X	7.5	.25	4.5	.15	18.02	.60	0.0	
24	O	6.9	.23	.6	.02	20.8	.69	1.7	.06
	□	7.5	.25	2.4	.08	17.1	.57	3.0	.10
	Δ	6.9	.23	.6	.02	19.2	.64	3.3	.11
	X	5.25	.18	7.0	.23	17.75	.59	0.0	
41	O	.92	.03	1.0	.03	28.08	.94	0.0	
33	□	4.67	.16	.25	.01	25.08	.83	0.0	
30	Δ	2.33	.08	.84	.03	16.83	.56	10.0	.33
36	X	1.25	.04	18.25	.61	10.50	.35	0.0	

1 Average of 3-30 minute time samplings in one day

O Infant O

□ Infant □

Δ Infant Δ

X Normally hearing infant

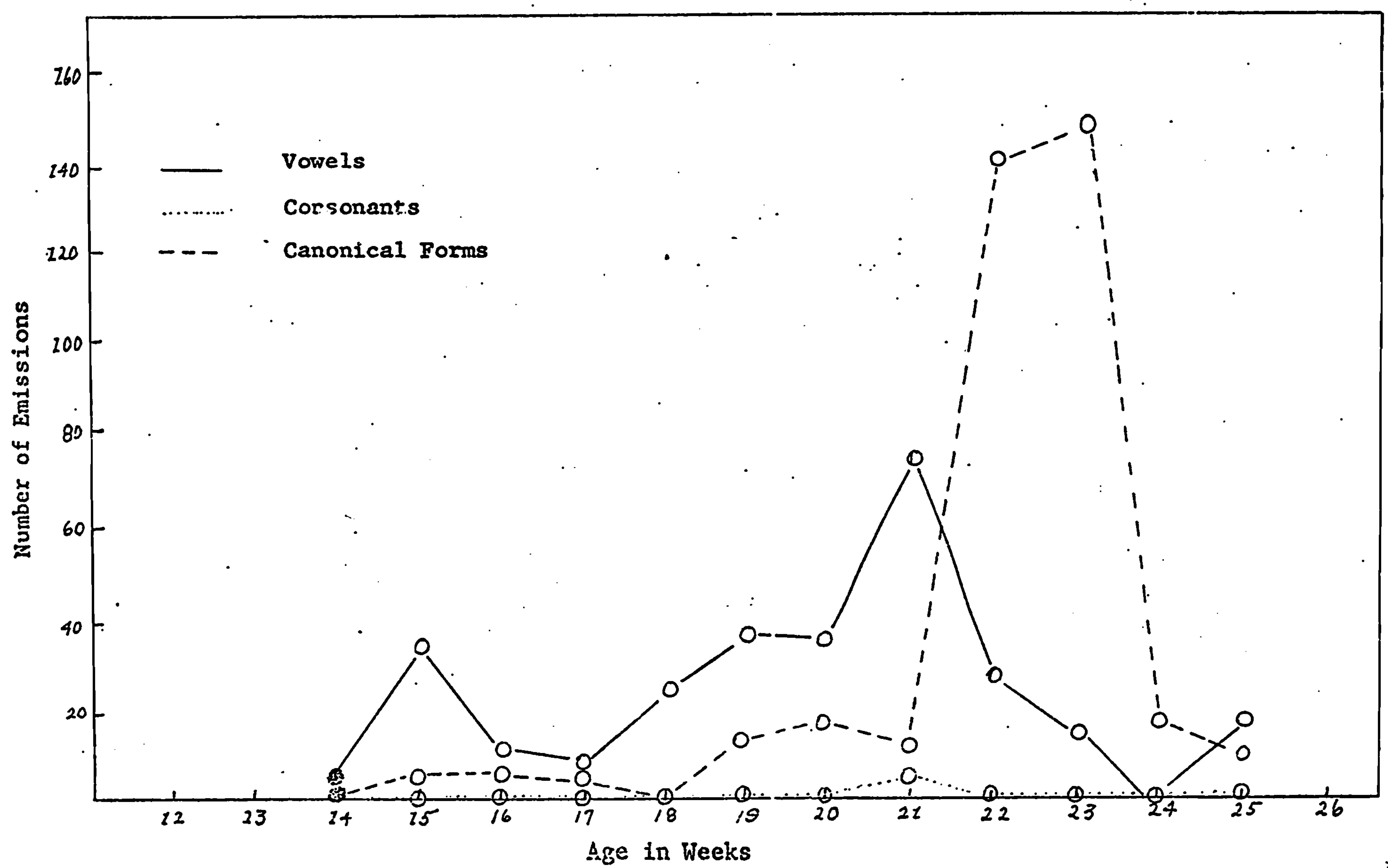

Figure 1 Growth Curve as Measured by the Number of Utterances for Vowels, Consonants and Canonical Forms for Infant O

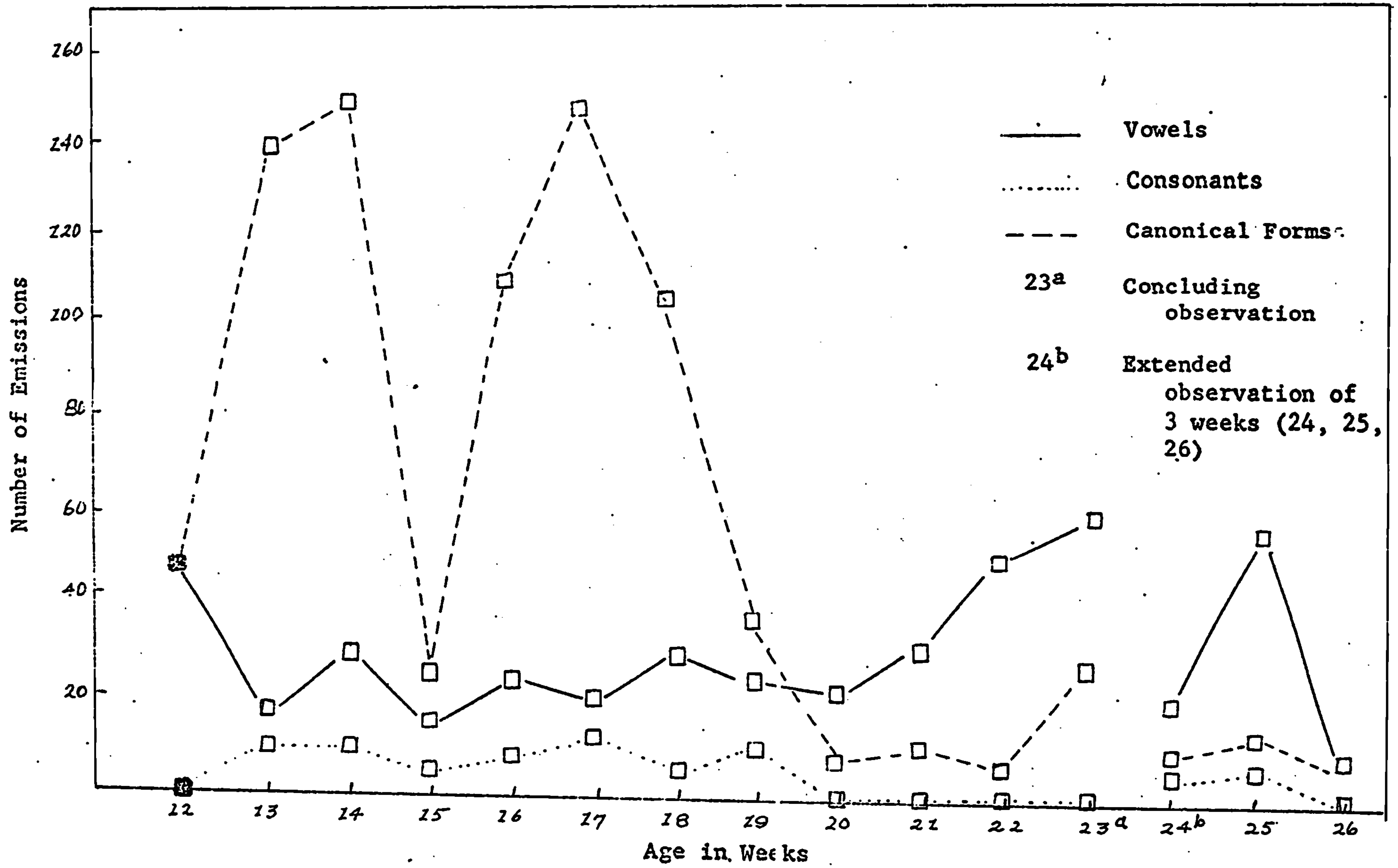

Figure 2 Growth Curve as Measured by the Number of Emissions for Vowels, Consonants and Canonical Forms for Infant □

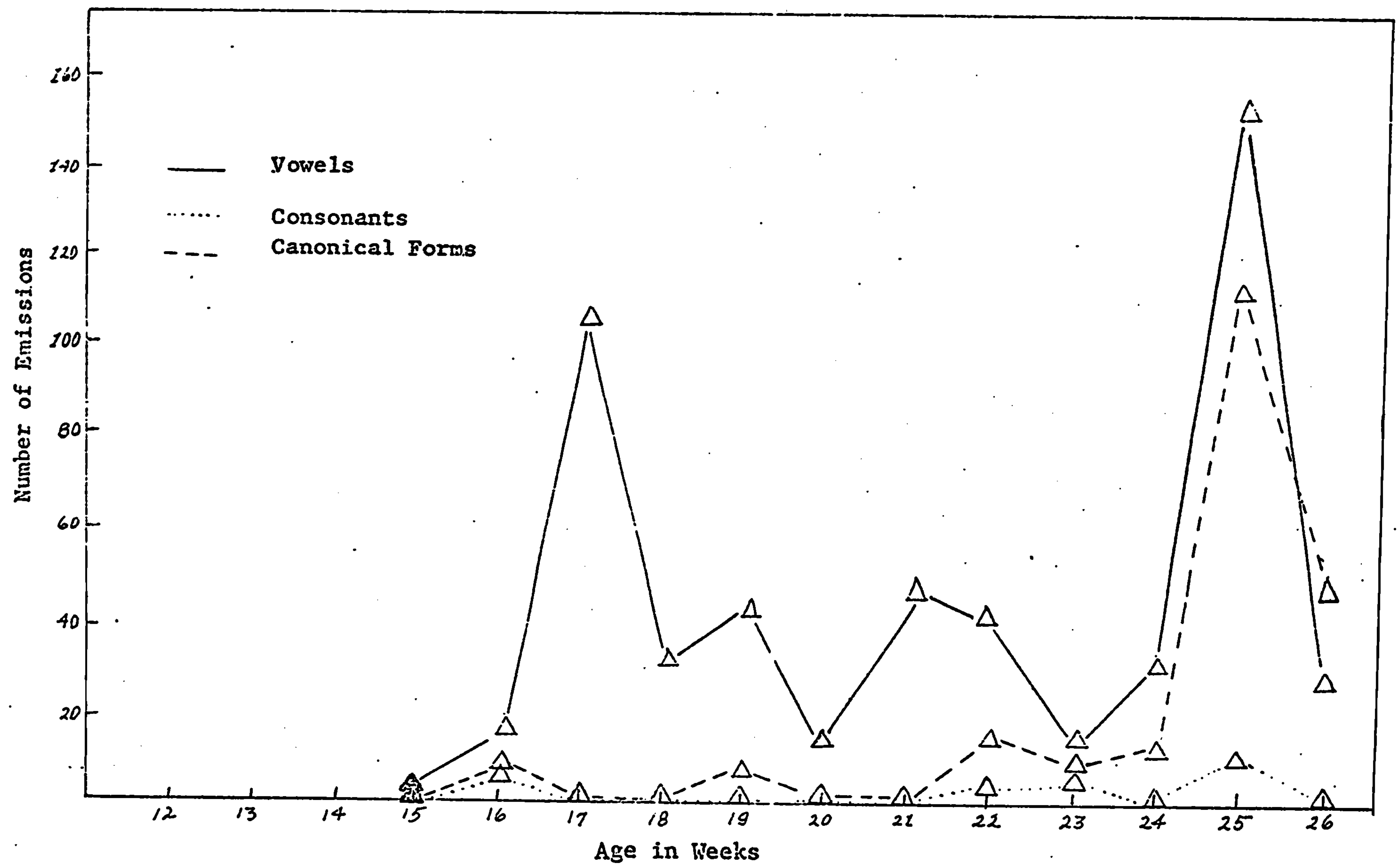

Figure 3 Growth Curve as Measured by the Number of Emissions for Vowels, Consonants and Canonical Forms for Infant Δ

PSYCHOLOGICAL SYNERGISM

An Approach to Consideration of Problems of the Hearing Handicapped Retarded

Sue Allen Warren, Ph.D.; Boston University; March 1972; C.E.C., Washington

Review of studies of hearing handicap in retarded populations and of retardation in hearing handicapped populations strongly suggests that the extent of the problem is far out of proportion to the amount of psychological research done on this multiple handicap combination. Furth (1966) has studied cognitive functioning. Vernon (1969) describes psychological characteristics associated with the retarded deaf. Talkington and Hall (1969) reported that hearing impaired children (50dB loss bilateral in speech range) were more prone to self-injurious behaviors than a matched group of normal hearing retardates (who were more prone to attack normal peers).

However, the confusion about "primary handicap," problems of measuring hearing in retarded populations, and the tendency of some professionals to reject standardized intelligence tests as unrepresentative of "true" intelligence level in deaf children have all contributed to a dual dilemma which retarded research on the problem.

Measurement of intelligence should not be confused with a popularity contest, nor should audiometric studies be confounded with magical thinking. If children are to be served appropriately, if research is to be done, the most accurate measurement techniques possible must be used.

Even in dually handicapped populations, intelligence tests are the best predictors of academic achievement, (which is what intelligence tests do, of course) and the most reliable single psychological measures available. Much of the confusion and rejection of such tests has been a reflection of over-expectations, of failure to recognize that these are measures of current intellectual functioning. Across relatively short time periods, rather precise predictions can be made by careful clincians; long term predictions may be somewhat more hazardous and may depend on several factors.

Vernon and Brown (1964) reviewed techniques of psychological assessment and suggested appropriate scales for measurement of intellectual functioning in a hearing handicapped population. Development of a variety of audiometric approaches such as TROCA (Lloyd, 1970; Fulton and Lloyd, 1969) has made it possible to estimate with considerable reliability the hearing functioning of even profoundly retarded individuals.

Improved evaluation techniques may permit efforts previously spent on arguing relative contribution to disability of retardation versus hearing loss to be diverted to considering combinations of characteristics, or "syndromes" of characteristics which can be measured fairly readily. Use of scales having standard scores (of approximately equal intervals) would permit comparison of various characteristics of an individual, and comparison against a norm, or general population.

Comparing deviations from the norm on Measured Intelligence, Adaptive Behavior (Social Maturity), degree of Hearing Handicap, and level of complexity of Speech Skills could presumably provide more meaningful information and greater potential for appropriate program planning if these several characteristics could be considered in combinations.

P.S.

Since intelligence test results are provided in standard scores, levels of retardation in intellectual functioning can be reported conveniently in terms of standard deviations below the mean (e.g. 100 IQ). Generally, two standard deviations below the mean has been considered a reasonable top limit for the designation of mental retardation. Thus, Stanford-Binet IQ of 67 (plus or minus about 5) would be the top limit of MILD mental retardation. Similar, if less precise, levels can be established for Adaptive Behavior impairment. (See Table 2). Level of Hearing impairment can be scaled into decibel (dB) loss bilaterally in the speech range using the ISO levels. Another possibility might be to set up a scale in terms of apparent auditory functioning difficulty; e.g., Profound hearing impairment: No useful hearing in either ear: Severe hearing impairment: sufficient hearing to recognize loud sounds such as heavy motors and loud voices but not enough for speech hearing; Moderate: Ability to comprehend vowel sounds and comprehend a few highly distinctive words; Mild: Comprehends some speech, enough to follow directions, but with much error; Below Average/Borderline: Misinterprets spoken words frequently, misses certain sounds consistently. A similar scale for speech deficit could be developed or used in like manner; either levels could be established on a standardized scale, or a functional set of categories could be developed; e.g., Profound: No meaningful words or gestures; Severe: Single words, nouns or verbs; Moderate: Many single words plus ability to indicate verb-object relationships; Mild: Simple 4 to 10 word sentences, questions, statements of fact; Borderline: of very simple conditional statements and very simple grammatical construction but no ability to use fluent, complex language to express complex concepts. (These suggestions are for illustrative purposes only and not intended as well developed scales of Hearing impairment of Speech complexity level.)

The establishment of several dimensions of measured or rated compe ence which can be compared against the same standard- expectations for normal peers on intelligence and adaptive behavior and in terms of functional reference points for hearing and speech- makes possible the development of categories or "syndromes" with various combinations of characteristics.

To illustrate: Let the number 5 always indicate Profound impairment. (Letters could be used as easily, but might provide confusing words or pseudo-words in some combinations). The number 4 can be assigned to the Severe level, etc. Thus, Profound: 5, Severe: 4, Moderate: 3, Mild: 2, Borderline/Below Average: 1, No impairment: 0.

Arrange dimensions in the order: Measured Intelligence, Adaptive Behavior (Social Maturity), Hearing level, Speech level.

A 9-year-old boy might have Mild (2) Intellectual impairment, Mild (2) impairment in adaptive behavior, Severe (4) Hearing impairment, and Profound (5) Speech complexity impairment. His "category" would be indicated by the code 2-2-4-5. In a category coded 2-2-4-5 it seems reasonable to hypothesize that the hearing impairment is a relevant factor in retarding development in other areas, so remedial procedures in the hearing area would have high priority.

Another 9-year-old boy with a 4-3-1-4 pattern would be a less promising candidate for marked progress in intellectual or adaptive functioning when the hearing impairment was remedied.

P.S.

Use of multi-dimensional system might help to reduce some of the debates about whether the Deaf-MR children should be taught by teachers trained to work with the retarded, as suggested by Pronovost (1970) or served by individuals who are knowledgeable in techniques of working with the deaf (Warren and Kraus, 1963). Since there is great discrepancy in definitions of "hearing handicap" by those who work with the retarded little agreement on the definition of mental retardation by those who work with the deaf (Talkington and Hall, 1972), any efforts to provide consistent termiŋology and classification should result in improved communication across groups of professionals.

With multi-dimensional systems, one loses the ordinal nature of scales set up in terms of levels. A 4-2-2-3 pattern is not "worse" than a 3-2-2-4 pattern. One cannot "add" the numbers from different scales of good, better, best or bad, worse, terrible. (One could do so, of course, but to do so might suggest impairment in intellectual functioning on the part of this adder unless he were a highly sophisticated scaling specialist with a method in his mathematizing). Since categories would be a simple nominal scale rather than ordinal, there might be some decrease in the stigma of "labels" as in the current practice; a 5-5-5-5 category would still be lowest, perhaps, but other combinations would be less easy to stigmatize, at least within groups of handicapped individuals and at least initially. Possibly, such categories as these will also eventually become new verbal sands in which to bury professional heads, but the task will be more difficult.

More important than decreasing stigma is the possibility of discovering how various combinations of characteristics may relate to developmental and personality factors. Consider the possibility that a child with two major impairments is more than doubly handicapped. For example, the child with impaired hearing and some cerebral dysfunction which interferes with intellectual development may be far more disabled than if these characteristics operated independently of each other. Use the analogy of chloral hydrate and alcohol (Mickey Finn). In small amounts, the sedative chloral hydrate is relatively harmless; so is an ounce of alcohol. The addition of alcohol potentiates the chloral hydrate to the extent that it becomes more than 20 times more potent than it was without the alcohol. Such a synergistic effect might also be the case when dual impairments are found in the same individual, at least in certain combinations. For example, a mild hearing impairment might be far more handicapping in a mildly retarded child than to a child of average ability; the average child might derive clues from context more readily than the retarded child, thus compensating for hearing impairment in a manner not available to the retarded child. On the other hand, the mildly retarded child without hearing impairment might be far more able to deal with his environment than a retardate with hearing impairment. Some other child with severe intellectual retardation, excellent hearing, and no speech might be more disadvantaged than the severe retardate with excellent hearing and some speech.

Such speculations and possiblities are based on conclusions derived from "armchair logic" rather than empirical studies. Attempts to establish systmes and patterns would provide possibilities for testing propositions. Are dual handicaps synergistic? Does hearing handicap tend to "potentiate" mental retardation? Do the Deaf-Retarded require dually trained teachers, or is a "whole new breed" of teachers needed? Finally, do professionals themselves "potentiate" the problems of the Deaf-Retarded child by their stubborn refusals to recognize retarded intellectual functioning in hearing handicapped children and their almost casual ignorance of hearing problems in retarded children?

To coin a phrase...further investigation appears warranted.

TABLE I

MEASURED INTELLIGENCE LEVELS

0	Average or Above:	Not as much as I s.d. below mean (e.g. WISC 85 and above)[a]
I	Below Average or Borderline:	I - 2 s.d. below mean (e.g. WISC 70 to 84)
2	Mild Intellectual Retardation:	2-3 s.d. below mean (e.g. WISC IQ 55 to 69)
3	Moderate Intellectual Retardation:	3-4 s.d. below mean
4	Severe Intellectual Retardation:	4 - 5 s.d. below mean
5	Profound Intellectual Retardation:	5 s.d. or more below mean

[a]The approximate nature ("test error") should be taken into consideration and recognition given to the probability that the "obtained IQ" should be interpreted as about plus or minus 5; i.e. 60 IQ interpreted as "between 55 and 65."

ADAPTIVE BEHAVIOR (SOCIAL MATURITY) PROPOSED LEVELS[a]

Social Age Equivalent (Approximate) in Months[b]

Chronological Age	Level of Social Maturity (Adaptive Behavior) Retardation				
	5	4	3	2	1
Months	Profound	Severe	Moderate	Mild	Below Average (Not Retarded)
24 (2 yrs.)	1 - 4	5 - 8	9 - 12	13 - 16	17 - 20
30	1 - 5	6 - 10	11 - 15	16 - 20	21 - 25
36 (3 yrs.)	1 - 6	7 - 12	13 - 18	19 - 24	25 - 30
42	1 - 7	8 - 14	15 - 21	22 - 28	29 - 35
48 (4 yrs.)	1 - 8	9 - 16	17 - 24	25 - 32	33 - 40
54	1 - 9	10 - 18	19 - 27	28 - 36	37 - 45
60 (5 yrs.)	1 - 10	11 - 20	21 - 30	31 - 40	41 - 50
66	1 - 11	12 - 22	23 - 33	34 - 44	45 - 55
72 (6 yrs.)	1 - 12	13 - 24	25 - 36	37 - 48	49 - 60
78	1 - 13	14 - 26	27 - 39	40 - 52	53 - 65
84 (7 yrs.)	1 - 14	15 - 28	29 - 42	43 - 56	57 - 70
90	1 - 15	16 - 30	31 - 45	46 - 60	61 - 75
96 (8 yrs.)	1 - 16	17 - 32	33 - 48	49 - 64	65 - 80
102	1 - 17	18 - 34	35 - 51	52 - 68	69 - 85
108 (9 yrs.)	1 - 18	19 - 36	37 - 54	55 - 72	73 - 90
114	1 - 19	20 - 38	39 - 57	58 - 76	77 - 95
120 (10 yrs)	1 - 20	21 - 40	41 - 60	61 - 80	81 - 100
126	1 - 21	22 - 42	43 - 63	64 - 84	85 - 105
132 (11 yrs.)	1 - 22	23 - 44	45 - 66	67 - 88	89 - 110
138	1 - 23	24 - 46	47 - 69	70 - 92	93 - 115
144 (12 yrs.)	1 - 24	25 - 48	49 - 72	73 - 96	97 - 120
156 (13 yrs.)	1 - 26	27 - 50	51 - 76	77 - 100	101 - 130
168 (14 yrs.)	1 - 28	29 - 52	53 - 80	81 - 104	105 - 140
180 and up	1 - 30	31 - 54	55 - 84	85 - 108	109 - 150

[a]Estimates of levels of adaptive behaviors are not practical at this time in such precision as standard deviations, or as may be implied by casual reference to this table. This probably reflects the nature of the concept as much as the measurement devices currently available. These figures are intended as guidelines for use after the available scales have been used (e.g., AAMD Adaptive Behavior Scale, Vineland Social Maturity Scale).

[b]Application of a simple Chronological Age to Social Age ratio formula would provide that the Profound level would yield a ratio of approximately 17 and below, Severe level about 18 to 30-35, Moderate level of about 35 to about 50-55, Mild level about 50 to 65-70. (All ratios multiplied by 100 to remove decimals).

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PREDICTING RECOVERY FROM STUTTERING
IN A SCHOOL AGE POPULATION

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With the mounting evidence that a significant number of stutterers recover without therapeutic intervention, the potential value in identifying prognostic indicators of spontaneous recovery from stuttering is obvious. The purpose of this paper is to review recent studies indicating how many stutterers may be expected to recover without therapeutic intervention and to describe, for clinical research purposes, a chronicity prediction checklist for school age stutterers based on hypotheses and data reported in the literature.

Recovery From Stuttering Rate

Glasner and Rosenthal (1957) studied parental diagnosis of stuttering in young children through parental responses to questions asked by speech therapists in 996 interviews of parents of children approaching the first grade level. One hundred and fifty-three parents said that their children (15.4 per cent of the sample) had stuttered at some time. 52.5 per cent of these children were reported to have stopped stuttering.

Andrews and Harris (1964) reported the results of a longitudinal investigation of childhood diseases conducted by the University of Durham and the Health Service of the city of New Castle upon Tyne from 1946 until 1962. A family survey was made of all children born within the city limits during May and June 1947. Originally, 1,142 children were involved, but at age 15, only 750 children remained within the survey. At regular intervals, a speech therapist saw all children in whom defective speech development or stuttering has been reported, as well as seeing a one in ten sample of the total group. Twenty-seven of the 847 children remaining in the study at its conclusion were noted to have had a period of stuttering which lasted six months or more. Andrews and Harris concluded that four out of five stutterers (80%) recover.

Sheehan and Martyn (1966, 1970) reported data on spontaneous recovery obtained through interviews of 5,138 students at the University of California, of whom 147 (2.8%) had at some time been categorized as stutterers. The interviews were conducted by four speech clinicians as part of the 1964, 1965, and 1967 registration student health examinations. The interviews were structured to facilitate the identification of active stutterers. Spontaneous recovery was found in four-fifths of all suttering cases.

Cooper (1971) replicated the 1970 Sheehan and Martyn study on a younger and presumably more heterogeneous population. 5,054 Tuscaloosa, Alabama Junior and Senior High School students were interviewed by speech clinicians. One hundred nineteen active stutterers were observed and another sixty-eight students reported recovery from stuttering (a stuttering incidence rate of 3.7 per cent). This one-third (36%) recovery rate for the total population, while contrasting with the Sheehan and Martyn (1970) four-fifths recovery rate for college students, was found to vary from less than one-third (30%) in the Junior High group to approximately one-half (44%) in the High School population.

Dickson (1971) studied the reported incidence of incipient stuttering symptoms in an elementary and Junior High School population; the percentage of spontaneous remission experienced at each grade level; and the duration of the symptoms and the age at which remission was noted. A parental questionnaire was distributed in the Williamsville School District #1 of suburban Buffalo, New York. Of 5,750 questionnaires distributed, 70% were returned. The total population studied was 3,923 students with 3,276 being from the elementary school. 369 students (9%) were reported as stuttering or having stuttered. Approximately 55% or 196 parents of the 396 students reported that their children experienced spontaneous remission of their symptoms.

With respect to recovery from stuttering, the above noted rates vary from 36% reported by Junior High School students (Cooper, 1971) to 80% reported by college students (Sheehan and Martyn, 1970). Andrews and Harris (1964) and Dickson (1971) suggest rates of 80% and 90% respectively but note that their figures include the developmentally disfluent child whose stuttering-like behavior lasts a matter of months and is no longer present by age six. Excluding this "developmentally disfluent non-stuttering child" from an estimate of recovery from stuttering rate, it appears that the best guess at this time is that from 50% to 80% of those who stutter for a significant period of time recover spontaneously.

Recovery Rate During The School Age Years

Wingate (1964), using a questionnaire developed to obtain from recovered stutterers information relative to their stuttering, background factors of pertinence to stuttering, and factors believed to have been involved in the recovery from stuttering, studied fifty self-reported recovered stutterers ranging in age from 17 to 54 with a mean age of 34.3. Sixty per cent of the subjects stated that recovery occurred during adolescence. Except for one male, the age range at time of recovery reported by males was between nine and 26 years with 73% of the recoveries occurring between ages fourteen and twenty.

Shearer and Williams (1965) studied spontaneous recovery from stuttering in 43 males and 15 females between the ages of seventeen and twenty-one. Based on information obtained during subject interviews, Shearer and Williams reported that, in all instances, recovery from stuttering was reported to be a gradual process which could occur at any age. They noted:

> "...no central tendency appeared in the ages of recovery, although a slightly greater number of subjects experienced recovery as they approached adolescence between the ages of thirteen and sixteen." (1965, p.298)

Andrews and Harris (1964), in the study noted above, found that sixteen of their thirty-four recovered stutterers recovered after the age of six. Cooper, (1971), found the percentage of recovered stutterers to increase from 30% in the Junior High years to 44% in the High School years. Dickson (1971) found that 83% of the stutterers in his sample experienced spontaneous recovery by 8 years of age or earlier. By 10 years of age, 94% of the group were reported to have recovered from stuttering. Dickson noted:

> "There was a continual increase in the percentage of the stutterers who outgrew incipient symptoms through grade 9. The peak periods of remission occurred at kindergarten, grade 4, and grade 9. At the ninth grade level, 67% of the stutterers experienced remission of symptoms and 33% retained symptoms." (1971,p.103)

On the basis of the above noted studies, it does appear safe to conclude that spontaneous recovery does occur in many stutterers during their school years. However, there does not appear to be sufficient data to begin to estimate the spontaneous recovery rate one might expect from year to year. What is needed to obtain such data, of course, are longitudinal studies with explicit behavioral definitions of "stuttering."

At this time the Andrews and Harris (1964) study appears to provide the only longitudinal data available. They concluded:

> "From this material it seems that there may be three relatively distinct

groups of stutterers. Firstly, a developmental group which comprises 2 per cent of the population and two-fifths of the total stutterers. They stutter for only a month or two during the acquisition of language. Next, a benign group of stutterers who begin at any time between 3 and 11 years and only stutter for a year or two before spontaneously remitting. This group also comprises 2 per cent of the population or two-fifths of all stutterers. Lastly, there is a persistent group comprising 1 per cent of the population, or one-fifth of the total stutterers." (1964, p. 33)

Assuming that most developmental stutterers will have recovered prior to school placement, this conclusion might be interpreted to suggest that 2 per cent of the school population will experience recovery from periods of disfluency sufficient in duration and in severity to warrant the label stuttering, while one per cent will continue to stutter. If that assumption is accurate, a clinician might expect that two out of every three stutterers observed in a school age population will recover spontaneously.

<u>Chronicity Prediction Checklist</u>

Assuming that two out of every three stutterers speech clinicians meet in the schools will recover spontaneously, the value in differentiating between the chronic and the episodic stutterer is obvious. A review of the literature dealing with the variable related to chronicity also makes it obvious that presently not enough is known to make such a differentiation knowledgeably. Van Riper has even characterized what literature there is as being "miserable" (1971, p. 41). However, Van Riper also noted:

> "Perhaps some day we shall have such a technology, but we shall not wait for that time with bated breath. There is work to be done in the vineyard and we must use the tools of today." (1971, p. 435)

In keeping with Van Riper's (1971) sentiment, and with an awareness that some will feel that it is premature to venture into the "vineyard" of stuttering chronicity prediction, the "Cooper Chronicity Prediction Checklist For School Age Stutterers: An Inventory For Research" was created (see Figure 1).

The Cooper Chronicity Prediction Checklist For School Age Stutterers: An Inventory For Research consists of twenty-seven questions which may be answered by the speech clinician with yes or no responses after consultation with the stutterer's parents and after observations of and interaction with the stutterer. Responses to the questions provide information concerning historical data (e.g., onset, family history of stuttering), the parent and child attitudes towards the stuttering (e.g., does child perceive himself as stutterer?) and the current behaviors associated with the stuttering (e.g., do prolongations last longer than one second?). It is suggested that "yes" responses may be interpreted as predictors of stuttering chronicity but that no individual question weighting for predictive value should be attempted.

The questions were posed to obtain information concerning variables which have, in the literature, either been found to be related to chronicity (e.g., severity) or have been suggested as being related (e.g., self concept as a stutterer). Obviously, cause-effect relationships are not implied. However, the relationships observed may, on a cumulative basis, not only assist in predicting recovery from stuttering, but may subsequently assist in the identification of the variable having a cause-effect relationship to spontaneous recovery from stuttering.

Chronicity Predictive Variables

Following is a brief review of the literature concerning variables which have been found, or have been suggested to be, related to chronicity and upon which the questions in "The Cooper Chronicity Prediction Checklist For School Age Stutterers: An Inventory For Research" are based:

Chronicity and Family History. Cooper (1971) found a statistically significant relationship indicating greater recovery rates for stutterers having no family history of stuttering. Sheehan and Martyn (1970) found no such relationship and Wingate (1964) found forty-one per cent of the males and 48% of the females in his study of recovered stutterers reported cases of stuttering elsewhere in the family. Although the evidence concerning the relationship between chronicity and family history of stuttering is conflicting, the item was included in the checklist.

Chronicity and Severity. There appears to be agreement in the literature regarding a positive relationship between chronicity and stuttering severity. Glasner and Rosenthal (1954) noted:

> "The findings suggest that, to some extent, the chronicity of the disorder and the resort to active, corrective measures may be related to each other only indirectly because a third factor associated with both, namely, the initial severity of the disorder; that is, the more severe the initial disorder, the more likely that it will endure and elicit corrective measures." (1954, p. 294)

Andrews and Harris (1964) observed a significant positive relationship between severity and chronicity and Wingate (1964) found that most of the 54 recovered stutterers in his study reported their stuttering as having been "moderate" (14 males, 6 females) or "severe" (14 males, 8 females). Sheehan and Martyn (1970) found a significant negative relationship between severity level and recovery. Cooper (1971) although finding no statistically significant relationship between severity and chronicity, observed a 49% recovery rate for the mild stutterers and a 30% recovery rate for the severe stutterers.

Chronicity and Duration of Stuttering. Andrews and Harris (1968) found that two-thirds of the stutterers in the 1,000 family survey had symptoms for less than two years and they concluded that a child not necessarily be considered for treatment unless the disorder has lasted longer than two years. Dickson (1971) concluded:

> "Some children who eventually outgrow their stuttering behavior may retain symtoms for 1 or 2 years; some may continue to show symtoms of disfluency for as long as 4-6 years (1971, p. 105)

Wingate (1964) found no such relationship between recovery and duration of stuttering. Only eight of Wingate's fifty recovered stutterers stuttered for less than five years. Inspection of Wingate's data in the table "Duration of stuttering in relation to age and onset, as listed by 50 recovered stutterers" (1964, p. 315) reveals that eighteen subjects stuttered 2-9 years; twenty stuttered from 10-15 years; and twelve stuttered for 16-33 years. Although again the data is contradictory, a question concerning the duration of stuttering was included in the chronicity checklist for research purposes.

Chronicity and Type of Initial Disfluency. Sheehan and Martyn (1970), in discussing their findings, concluded:

> An important developmental sequence leading to persistence and chronicity involves beginning with blockings, experiencing strong fear, and developing into a severe rather than a mild case. On the other hand, beginning with easy repetitions and hesitations, experiencing moderate fear, developing mild or moderate stuttering appears to lead to recovery. (1970, p. 287)

Cooper (1971) in a replication of the Sheehan and Martyn (1970) college population study on a junior and senior high school population found no significant relationship between the type of initial disfluency and chronicity.

Dickson (1971), on the basis of his results, concluded:

> Stutterers who show remission of symptoms display repetitions primarily; those who retain symptoms get stuck on or between words. (1971, p. 108)

Chronicity and Sex. No evidence could be found for a difference between males and females with respect to a recovery from stuttering rate. Glasner and Rosenthal (1957) reported that of their subjects diagnosed as stutterers, 56 per cent of the boys and 51 per cent of the girls were said to have stopped stuttering. The difference was found not to be statistically significant. Although no test of significance was applied, Cooper (1971) reported a 34% recovery rate in males and a 43% recovery rate in females.

Chronicity and Parental Attitudes. Glasner and Rosenthal (1964), as previously noted, found a relationship between parental concern and chronicity although they interpreted this as reflecting how severe the parent thought the stuttering was. In addition, Glasner and Rosenthal concluded:

> When emotional problems were seen as the cause (by the parent), 41% (of the stuttering children) were said to have stopped stuttering, whereas 82% of the stutterers thought to be reacting to environmental influences were said to have stopped. (1964, p. 295)

Although Dickson (1971) noted that parental suggestion, in the form of admonishment or advice, was commonplace with both the spontaneously recovered stutterers and the chronic stutterers, he found:

> Significantly more parents of children who retained symptoms considered incipient stuttering to be a speech problem. (1971, p. 106)

Chronicity and Stutterer Attitudes. While all but five of Wingate's (1964) recovered stutterers reported they had had a negative reaction to their stuttering, with embarrassment, fear, or shame being the most frequently named reaction, Sheehan and Martyn (1966) found:

> Those who had incorporated stuttering into the self-concept were much more likely to have remained stutterers, while those who had not incorporated stuttering into the self-concept were more likely to have recovered...whether stuttering persists is, in other words, largely a function of how the stutterers views himself and how he feels about himself in relation to others. (1966, p. 130)

Chronicity and Gradual Improvement. There appears to be general agreement that recovery from stuttering is a gradual process perceived by the stutterer as a gradual decrease in stuttering symptoms. Sheehan and Martyn (1970) concluded:

> On the important observation that recoveries occur gradually (Sheehan et al, 1957), our results are in agreement with those of Wingate (1964), Shearer and Williams (1965), Sheehan and Martyn (1966), Martyn and Sheehan (1968) and Dickson (1968). (1970, p. 288)

Chronicity and the Distinctive Features of the Stuttering Moment. Van Riper (1971), after reviewing literature concerned with differentiating between the characteristics of a moment of stuttering and a normal disfluency, created a chart which he labeled "Guidelines for Differentiating Normal From Abnormal Disfluency" (1971, p. 28). Most of the items under the "Behavioral Indicators of Chronicity" section of "The Cooper Chronicity Prediction Checklist for School Age Stutterers" are adapted from those guidelines. Van Riper noted that his listing:

> ...can hardly be said to be complete and we are not happy with the quality of the items nor with their lack of quantification. They are just the best indications known to those who daily confront these problems...Obviously, all these items are not equal in differentiating value...Let each person devise his own item weights until we have the research we need so badly. We must do the best we can with what we have available to us. (1971, p. 29)

As Van Riper noted, many of the distinctive features he suggests as indicators of stuttering have been suggested by clinical observation while others are suggested by research data which he reviews in his presentation of guidelines for differentiating normal from abnormal disfluency. For research purposes, these items suggested by Van Riper have been included in the Chronicity Prediction Checklist.

SUMMARY

A review of the literature regarding recovery from stuttering indicates that clinicians might expect that two out of every three stutterers observed in a school age population will recover spontaneously. Recognizing a need to identify those children who will not recover without intervention, and in view of the lack of research on which to base such identifications, a research inventory which clinicians might use (The Cooper Chronicity Prediction Checklist For School Age Stutterers) was described. Research suggesting the potential predictive value of the various factors included on the checklist was reviewed.

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FIGURE I.

THE COOPER CHRONICITY PREDICTION CHECKLIST FOR SCHOOL AGE STUTTERERS
A RESEARCH INVENTORY FOR CLINICIANS

FOR: ______________________________ BIRTH: ______________

Last Name First Middle

ADDRESS: ______________________________ AGE: __________

GRADE: __________

PARENT: ______________________________ SCHOOL: ______________

INFORMANTS: ______________________________

Directions: Place check mark in appropriate column indicating answer to question. Yes responses may be interpreted as predictors of stuttering chronicity. No item weighting for predictive value is attempted.

	YES	NO	N.A.	UN.
I. Historical Indicators of Chronicity				
1. Is there a history of stuttering in the child's family?------------------				
2. Is the severity of the stuttering increasing?----------------------------				
3. Were the parent's concerned about the child's stuttering before the child indicated awareness of the stuttering?----------------------------				
4. Did the stuttering begin with blockings rather than with easy repetitions and hesitations?--				
5. Is the stuttering now or has it ever been considered by the child to be "severe"?---				
6. Has the child been stuttering for four or more years?------------------				
II. Attitudinal Indicators of Chronicity				
1. Does the child indicate that he or she perceives himself or herself to be a "stutterer."?--				
2. Does the child indicate that he or she experiences communicative fear because of stuttering?---				
3. Does the child indicate that he or she believes the stuttering to be getting worse?--				
4. Do either of the parents consider the child to be a stutterer?---------				
5. Do either of the parents indicate that they believe the child will <u>not</u> outgrow the stuttering?--				
III. Behavioral Indicators of Chronicity				
1. Do syllable repetitions occur more than twice on the same word?---------				
2. Is the rapidity of the syllable repetitions faster than normal?--------				
3. Is the schwa vowel inappropriately inserted in the syllable repetition?-				
4. Is the airflow during the repetitions often interrupted?---------------				
5. Is vocal tension often apparent during the repetitions?----------------				
6. Do prolongations last longer than one second?--------------------------				
7. Do prolongations occur on more than one word in a hundred?-------------				
8. Are the prolongations uneven or interrupted as opposed to being smooth?-				
9. Is there observable tension during the prolongation?-------------------				
10. Are the terminations of the prolongations sudden as opposed to being gradual?--				
11. During prolongations of voiced sounds is the airflow interrupted?-------				
12. Are the silent pauses prior to the speech attempt unusually long?-------				
13. Are the inflection patterns restricted and monotone?-------------------				
14. Is there a loss of eye contact during the moment of disfluency?---------				
15. Are there observable and/or distracting extraneous facial or body movements during the moment of disfluency?-------------------------------				
16. Does the child actively avoid speaking situations?---------------------				

	YES	NO	N.A.	UN.
TOTALS------				

Checklist Completed by: ______________________

Date: ______________

Note: N.A.= Not Appropriate; UN.= Unknown

PRINT READING FOR VISUALLY IMPAIRED CHILDREN

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Among educators of visually impaired children there is the realization that a majority of their pupils--including many in the legally blind category --are those whose principal sense modality is still a visual one and that these children are, in the main, readers of print rather than braille materials.

Teaching approaches that will encourage the use of and help speed up the intake of information gained through print are essential because of the increasing reading load placed on today's grade school child, and because of the accelerating trend towards the integration of visually impaired children together with their sighted peers in the regular schools. These trends place an inordinate burden on the visually impaired youngster unless he is able to utilize the same materials as his peers and be assisted to achieve comparable levels of attainment in the tool subjects.

Today's concern with "sight utilization" is a concern with functional use of vision where standards of psychovisual efficiency are sought so that a visually impaired child, irrespective of his degree of visual acuity, will be placed in school according to his ability to read print materials (Bommarito, 1969). Lip-service has been paid to this philosophy for many years; teachers have recognized that large numbers of children with borderline vision read standard or even very small print faster and more effectively than large print, but it has been customary to provide these children with only large print materials. For some children who fell into the legally blind category, and where there was doubt as to the most appropriate reading medium, it has been considered advisable to establish braille reading skills--despite the fact that the children were known to have sufficient stabilized residual vision to enable them to read print! Fortunately these attitudes and practices are now giving way to the realization that a child with useful residual vision must be given every opportunity to acquire inkprint reading skills before the implementation of braille is considered.

Recent research into the merits of standard print vis-a-vis large print has given evidence that when partially sighted and legally blind children read under optimum reading conditions, and when corrective lenses for near vision have been prescribed for those students who need them, they perform as well in standard print as in large print on measures of reading speed and comprehension. Furthermore, for the most part, standard print is no more fatiguing to read than large print and is read at approximately the same distance from the eye. Also preference for either standard print or large print was found not to be related to performance on the preferred size of print (Sykes, 1971).

A concern with illumination and with the quality of print is necessary if we are to provide optimum conditions for legibility. Many low vision children require higher levels of illumination for reading, and a minimum of 50 footcandles has been recommended for classes of partially sighted children (Eakin, Pratt & McFarland, 1961). A few children may require a reduction in lighting and the classroom should be so organized that it is possible for these children to be accommodated. Other children may read holding the printed page very close to the eye, in which case the head may obscure the light and the page is then in the dark. Such an individual may be helped by a seat next to a window or by provision of a reading lamp; light intensity can be regulated by distance from the window or by moving the lamp, or by adjusting the level of intensity of the lamp. If a child uses a reading lamp it is important that glare be minimized by preventing too much contrast between the specific source of light from the lamp and the general room lighting, and also by ensuring that the shade of the lamp is towards the eye. Concern with general and specific sources of illumination will help eliminate distracting shadows on the reading page.

A portable reading lamp having a number of different levels of intensity is an extremely important, non-optical aid. It is this writer's opinion that each visually impaired child should be provided with his own reading lamp that would give him, at all times, the power to control the lighting situation to suit his individual requirements.

The quality of print is a most important determinant of legibility and much can be done by manipulation of the size, weight and spacing of print to bring about legibility. In one investigation the increase in legibility due to improvements in typography were of the order of 35 per cent for adult readers (Shaw, 1969). It is well known, however, that an increased print size is less important for most visually impaired children who can achieve a larger image simply by holding the print closer to they eye. Nonetheless, as teachers, we should do all that is possible to ensure that the print materials we use are clear and attractive and, above all else, meaningful! Familiar and meaningful material, it should be noted, can be read at a greater distance (Taylor, 1934) and more quickly (Erdman and Neal, 1968) than unfamiliar material. Educators may therefore bring about success and continued motivation by ensuring that any print materials they use are suitable in content and meaning fortheir students.

Posture in reading is important; an awkward and uncomfortable posture will result in general fatigue that will contribute to any visual fatigue that the child may be experiencing. Visual fatigue is one of the most significant educational problems of partially seeing children and is brought about because the child is expending maximum accommodation and is reading in an uncomfortalbe position with the book close to his eye. Much can be done to eliminate visual fatigue by paying attention to print quality and lighting and by ensuring that the child has a desk of the correct size. Some children can be helped by the provision of a reading stand and/or reading slits.

Flexibility in allowing the child to find his own most comfortable reading distance is essential. Children have the necessary accommodative powers that allow them to read by holding the book closer to the eyes. Observation of low vision pupils quickly reveals that, as with most normally sighted readers, they are constantly varying their reading distance and posture. Any attempt on the part of the teacher to enforce a "correct" reading distance and posture in the absence of adequate conditions for legibility is almost certain to result in resistance towards reading--the last thing one would want! The trenchant point has been made that since it is impossible at the present time to specify the educational significance from the type of eye defect, we should let each child choose

> those conditions (lighting, angle of viewing, type size) which are the most comfortable for him. Until we have actual evidence that all children with cataracts can best read from a distance of X inches with Y amount of light, etc., it seems arbitrary to do anything other than allow him freedom to explore and choose those conditions which are best for him. (Bateman, 1967)

There can be no doubt regarding the value of optical aids. Though views differ when it comes to the question of judging the limits of visual acuity below which optical aids are useful (Lebensohn, 1956; Milder, 1960; Sloane, 1961), there is clear evidence of the advancement in reading medium made possible by near-vision correction (Lebensohn, 1936; Rusalem, 1957; Gibbons, 1963; Fonda, Thomas & Gore, 1969). Furthermore, the use of optical aids may make the difference between classifying a child as blind or partially sighted for educational purposes.

Teachers should ensure that their pupils have received adequate correction for near vision and that those using optical aids have received assistance in the use of their aids. Practically all devices for improving reading vision involve shorter focal length, and as the depth of focus decreases with increasing lens power it becomes more difficult to maintain the reading page at a proper distance from the lens. The field of vision also is affected, and time must be given to allow the child to become adjusted to the narrower reading span. With children frequent re-evaluation is necessary to check present needs and requirements which are likely to vary from grade to grade. The child will need help in order to learn a new head and eye relationship and to readjust hand and eye relationships. Assistance is necessary to provide information regarding adequate amounts of illumination and to aid the child over the trial period that is so necessary to facilitate adjustment and adaptation to the use of the aid.

Specific assistance will have to be given to those children with no previous knowledge of print who have been enabled by the prescription of an optical aid to read print for the first time. Some of these students may be fluent braillists and may object to print reading because they feel it demeans them to return to the simple materials appropriate for a beginning print reader. It will be necessary for the teacher to design specially prepared materials for these students that are appropriate for their level of maturity, yet simple enough to give them the practice necessary to grasp the skills needed in print reading. It scarcely needs adding that low vision children must be given sufficient time, in an atmosphere free from distractions, in order to bring about satisfactory progress in reading.

Underlying the concern with the provision of low vision aids and good reading conditions is a concern with the process of teaching reading. Here we are not merely interested in performance but rather with inculcating a love of books and in encouraging good attitudes towards learning. Such attitudes can not be imparted if achild is pressured into reading before he is ready and able to achieve success, or if there is too soon an insistence on the achievement of reading skills.

Readiness for reading is important because secure foundations are necessary to ensure success. It has been stated that "Reading should not begin unless the child has a background of experiences necessary to relate what he is reading to his personal life." (Lowenfeld, Abel, & Hatlen, 1969). Many of our visually impaired children are developmentally retarded, lacking in verbal and auditory skills, and with poor mobility that so mitigates against those favorable opportunities for learning that can be developed in an environment that gives chances for social involvement and wide experiences. Without these opportunities a child is inevitably retarded in his mental, physical and emotional development and thus unlikely to be able to profit from school instruction.

Before a child is able to read print he must have progressed developmentally to that stage where fine visual discrimination becomes possible. In order that he may reach this level a secure foundation at earlier levels of development is essential. It will be necessary with many of our visually impaired children to ensure that they have had adequate gross muscular experiences and generalized bodily movement before they can move on to the more delicate muscular development required in visual discrimination. The child may be lacking in the hand-eye experiences that underlie visual discrimination and may need much exposure to 3-dimensional objects before he can move towards an understanding of 2-dimensional forms and letters.

The pioneering work by Barraga has emphasized the developmental aspects of vision and the need for specific training in visual discrimination. Her Visual Efficiency Scale is an indispensible instrument that enables the teacher to: 1) determine a child's visual functioning level, 2) develop prescriptive plans for the stimulation and development of vision, 3) develop good attitudes in her pupils towards "learning to see", and 4) develop a child's ability to control his eye-muscles in order to facilitate fixation, tracking and focus. (Barraga, 1970) The development of the visual skills suggested by Barraga and others undoubtedly have transfer value to the skills required in reading and other learning situations. A good number of pupils, however, may acquire the skills necessary in reading by directly learning through activities that are specific to the task. In other words, one might dispense altogether with "perceptual" materials and get to work with letters and words. A number of writers feel that the best way to teach reading is, in fact, to teach letters and words and to do this thoroughly rather than in side-stepping the issue by a concern with visual discrimination (Cohen, 1969; Mann, 1971). This may well be the case for most normally sighted children but is unlikely to be so with low vision children, especially those who have received little encouragement to use their residual vision for reading or any other purpose. In using visual discrimination instruments, however, it should be pointed out that a poor performance may be brought about as a result of an emotional problem, or poor motivation, rather than that of faulty visual perception.

Undergirding the remedial approach to the teaching of reading is the personal relationship between teacher and pupil. A good relationship is essential in order that the child may have the freedom to pursue his own interests without fear or boredom. The teacher should be concerned to provide a classroom situation that encourages the active involvement of the child in pursuits that are intrinsically interesting to him; acitivities that can arise out of his experiential background and therefore have meaning for him. Where there is a concern for education rather than for mere training, the teacher will be sure to cater to the individual requirements of her pupils, working from their strengths, rather than from their weaknesses and in this way ensuring that the child will experience success.

The language-experience approach to the teaching of reading is child-centered in that words and sentences evolve from the child's class and out-of-school activities. Children are encouraged to write and then read what they have written. The procedure is individualistic and allows flexible teacher-pupil interaction in a situation that is meaningful to each child, and therefore motivating. Such an approach, however, leans heavily on introducing whole words, phrases, and sentences to the child--a procedure that is impossible for some of our low vision pupils who may be unable to see more than one or two letters at a time. For this reason, a part-method rather than whole-method system of teaching reading is likely to be more appropriate for many low vision pupils.

One such part-method is the phonic approach that emphasizes the form and sounds of individual letters and groups of letter. However, this method has been criticized because, while children make rapid progress in word recognition they read more slowly because of the tendency to analyze too many words, and lack the quick recognition essential to fluent reading(Spache, 1972). Other part-methods such as the Initial Teaching Alphabet and Gattegno's Words in Color suffer from these same disadvantages plus the dependency on crutches (augmented alphabet and color) that eventually must be discarded. It must be accepted, however, that letters do have distinctive features that need to be recognized and it may be that we could take a leaf from the book of those who teach braille and introduce selected print letters in groups for ease of recognition andfor frequency of use, delaying the introduction of the less frequently used and more difficult letters.

Whether a whole-method or part-method system to the teaching of reading is favored--and it may be necessary to use both or a combination of methods to suit individual teacher-pupil requirements--it is often motivating to utilize machines such as the Language Master and Braille Instructasette that can be used equally well for either braille or print reading, and recognize the fact that speech and reading are complementary activities. Other fruitful approaches may involve the use of filmstrips or slides or closed-circuit TV. This is not to suggest that a teacher need necessarily resort to these gadgets, but rather to bear in mind that they are available and may be a means of reaching a child who is impervious to more traditional approaches.

As we progress from the beginnings of reading we must be sure to provide reading materials that are relevant to the child and that reflect his vital concerns. Many basal readers have serious shortcomings in content and give quite a false picture of the world. Furthermore, vocabulary control in these readers often results in a lack of literary quality (Spache, 1972).

At the intermediate level our pupils should be encountering reading materials drawn from a wide variety of sources in order that they may be able to handle printed matter other than in narrative form. In math and science, for example, ability is required in the handling of graphic and illustrative material and it is necessary to acquire a technical vocabulary for these fields of study.

We should provide our pupils with the skills necessary to skim, scan and review materials, so that they man modify their rate of reading and decide on the degree of comprehension required of particular materials. In view of the very slow reading rate of low vision students research into rapid reading techniques for these students is urgently needed. Organizing, reporting, note-taking, outlining and interpretive skills are very necessary to the development of critical reading skills and should not be delayed.

It must be emphasized that reading is an integral part of the entire curriculum and as such should be taught in conjunction, not separate from, such activities as writing, listening, art, drama, etc. Reading pervades every facet of the child's school work and, in this sense, every teacher has the need to be a teacher of reading.

It is the teacher's job to know her children well; she has to be congnizant of child growth and development in order to know when a child is ready for particular activities; she needs to know of the medical aspects of vision and the conditions that may interfere with vision; she needs to be aware of symptoms that may denote a vision problem; and she needs a knowledge of tests and instruments that can provide information relevant to the reading task. She needs to create those favorable opportunities for learning through individualized instruction and the use of teacher-prepared materials that have a multisensory base--so that all possible avenues of input may be explored. It must not be forgotten that the main mode of input for many low vision children will have to be an auditory one in order to overcome the difference in reading rate between the sighted and the visually impaired.

A teacher of the visually impaired needs to be thoroughly familiar with the wealth of special materials and aids available for her pupils and the sources of these materials. Above all she should cultivate skilled observation of her pupils and provide a secure, loving atmosphere offering a wealth of varied materials and approaches to reading. Where there is this kind of flexibility and opportunity her pupils can not help but learn.

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AUDITORY DISCRIMINATION PERFORMANCE AS A FUNCTION OF NON-STANDARD DIALECT

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A major problem in education today is the high prevalence of reading retardation among disadvantaged Negro children, many of whom experience difficulty with reading when they enter first grade. These children are frequently found to be deficient in auditory discrimination, an ability considered to be a necessary prerequisite for success in beginning reading, (Clark and Richards, 1966; Stern, 1966; Deutsch and Brown, 1964). However, the evidence used to define the auditory discrimination deficit is questionable. It is most often based on tests (e.g., Wepman Auditory Discrimination Test, 1958) which require the Negro child to differentiate words spoken in standard English, a pattern of speech somewhat dissimilar to the language pattern used by many Negro youngsters. The present study explored the view that these children's low scores on tests of auditory discrimination reflect primarily their unfamiliarity with standard English speech rather than any deficits in auditory discrimination ability.

A body of literature in the related area of speech points up a high relationship between speech pronunciation and auditory discrimination (Jones, 1962; Weiner, 1967; Cohen and Diehl, 1963; Prins, 1963). It has been shown that with normal speakers, auditory discrimination of speech sounds is related both to the kinds of sounds presented and the type of speaker who pronounces them. It is easier to discriminate among sounds pronounced by a speaker of one's own language than by a speaker of a foreign language. It is also easier to discriminate among sounds within one's own language than among those within a foreign language (Lotz, 1960; Singh and Black, 1966; MacNeilage, 1963; Liberman, 1961). Thus, a person's own auditory discrimination ability cannot be meaningfully evaluated without considering his own speech background.

Labov and others note that Negro dialect is different from standard English both in grammar and phonology (Labov, 1965, 1967; Pederson, 1964; Stewart, 1964). Labov found many pronunciation differences between Negro dialect and standard English speakers. He suggests that there are words which are pronounced as homonyms by Negro dialect speakers which are spoken contrastingly by standard English speakers. Examples are pin-pen, guard-god, roof-Ruth, and Cal-Carol. Pederson delineated grammatical correlates of Negro dialect which affect the way words ending in ing, s, or ed are pronounced.

Previous studies of auditory discrimination ability in disadvantaged Negro children did not specifically consider the relationship between auditory discrimination and speech in interpreting the findings. Moreover, the measures used were not sensitive to differences between Negro dialect and standard English speech. Therefore, it seemed appropriate to re-examine auditory discrimination ability in youngsters of this type with an instrument that specifically took into account the speech differences found between standard English and Negro dialect.

Purpose

The present study examined auditory discrimination ability in groups of Negro dialect-speaking children and Negro and white standard English-speaking children. The study sought to discover the extent to which a child's performance on a test of auditory discrimination is influenced by his own speaking and listening experience with the speech sounds used in the test. It would then be possible to determine if group differences in auditory discrimination performance were primarily related to dissimilarities in exposure to particular dialect and standard English features or to differences in general auditory discrimination ability.

Subjects

Three groups of one hundred and twenty first grade boys, forty in each group, were tested individually in auditory discrimination, verbal ability, and reading achievement.* Group I was composed of Negro dialect-speaking children, Group II of Negro standard English-speaking children, and Group III of white standard English-speaking children.

All subjects had entered first grade in the fall of 1966. They were between six and seven and a half years of age. No repeaters of first grade were included in the sample.

Subjects were selected according to the following criteria: 1) hearing was judged to be "normal" in both ears by school personnel who administered the Sweep Frequency Audiometer Test according to standards and procedures set by the Board of Education of the City of New York in 1966; 2) a score of eighty or above on the Goodenough-Harris Drawing Test. This cut-off point was selected in order to eliminate mentally retarded children from the sample. 3) Speech was judged as clearly representative either of Negro dialect or standard English as well as free from pathology; 4) demonstration of ability to understand the directions of the auditory discrimination test designed for the study.

Methods and Procedure

In order to examine the relationship between speech and auditory discrimination ability among the three groups of subjects, an auditory discrimination test was constructed with the following features:

* Since the scores on the reading tests did not bear directly on the questions posed in this article, they will not be discussed here. They can be found in Gottesman, Ruth L., Auditory Discrimination Ability in Standard English Speaking and Negro Dialect Speaking Children. Unpublished Ed.D. dissertation, N.Y.: Teachers College, Columbia University, 1968.

1. The test was composed of two kinds of word pairs: a) words which were clearly different in pronunciation for all groups of children (Contrast Items) and b) words which were pronounced contrastingly in standard English but homonymically in Negro dialect (Homonym Items). Labov's description of features of New York Negro dialect served as a guide for the selection of these items. Table I shows the word pair items selected for the test.

2. Word pair items were pronounced both by standard English and Negro dialect speakers. The speakers were selected after tape recordings of their speech had been analyzed and judged as representative of standard English or Negro dialect speech by a linguist highly experienced in the area of Negro dialect and standard English speech. Although the homonym word pairs were not pronounced as actual homonyms by the Negro dialect speakers, they were pronounced with considerably less contrast than when pronounced by the standard English speakers.

The Auditory Discrimination Test consisted of four subtests: 1) Homonym Items pronounced by Negro Dialect speakers (Homonym/Negro Dialect-Speaker Items); 2) the same Homonym Items pronounced by standard English speakers (Homonym/Standard English-Speaker Items); 3) Contrast Items pronounced by Negro dialect speakers (Contrast/Negro Dialect-Speaker Items); and 4) the same Contrast Items pronounced by Standard English speakers (Contrast/Standard English-Speaker Items). Scores for each of the subtests and for the total test were calculated for every subject in the study.

The test was recorded on tape and administered to the children individually using a Sony TC800 tape recorder. Each child was also given the Peabody Picture Vocabulary Test and the Vocabulary Test of the Stanford-Binet to measure general verbal ability.

Results

The mean age of subjects, scores on the Peabody Picture Vocabulary Test, Stanford-Binet Vocabulary Test, and the total Auditory Discrimination Test are reported in Table II. While there were no significant group differences in chronological age, one-way analyses of variance showed significant group differences in verbal ability and auditory discrimination performance (p .05) with Group III (White standard English speaking) scoring significantly higher than either Group II (Negro standard English speaking) or Group I (Negro dialect speaking).

The Auditory Discrimination Subtest scores were transformed to arcsine percentages and a three way analysis of variance of repeated measures after a model by Winer (1962) was performed. Table III shows the effects of group membership, speakers (Negro dialect and standard English) and items (Homonyms and Contrasts). The analyses resulted in significant F's (.05 level) for groups, for speakers and for items. Scheffe tests showed that Group III earned significantly higher mean scores on the total Auditory Discrimination Test than did either Group II or Group I. Group II, in turn, scored significantly higher than Group I. Since there were also significant interactions of group x speakers and group x speakers x items, Scheffe tests were applied to the group mean scores on the subtests of the Auditory Discrimination Test to determine the source of group differences.

The Scheffe tests indicated that most of the significant variance in the total test performance could be ascribed to the subtest Homonym/Standard English Speaker Items. These were the word pairs spoken by standard English speakers which are pronounced as homonyms in Negro dialect speech but as contrasting words in st ndard English.

Group I scored significantly lower than combined Groups II and III on these items. There were no other significant differences among the subjects groups in the remaining three subtests.

Neither group of Negro children (dialect-speaking and standard English-speaking) showed significantly different scores with either type of speakers. White standard English-speaking children, however, showed higher scores with standard English speakers than with Negro dialect speakers.

As shown earlier, there were also significant differences among groups in verbal ability as measured by the Stanford-Binet and the Peabody Picture Vocabulary Test. Therefore, in order to control for differences in verbal ability among groups, a one way analysis of covariance was performed on the subscores of the Homonym/Standard English Speaker Items, using the Peabody Picture Vocabulary Test scores as covariate. Table IV reports that the analysis produced an F of 4.13 (significant at the .05 level), indicating that even when the effects of verbal ability, as measured by the Peabody Picture Vocabulary Test, were held constant, there were still significant differences among group responses to Homonym/Standard English Speaker Items.

Discussion

The data strongly suggest that Negro dialect-speaking children are more successful in discriminating among sounds which are pronounced contrastingly in their dialect than among sounds which are pronounced as homonyms. This finding of the present study supports previous research in which it is reported that normal speakers discriminate most easily among sounds used in their own language. (Lotz, 1960; Singh and Black, 1966; Liberman, 1961).

The major source of group differences in test performance can be viewed as group differences in exposure to certain phonemic contrasts. When homonym items were contrastingly pronounced by standard English speakers the standard English-speaking children, familiar with hearing and speaking these sounds contrastingly, perceived them as such. However, when Negro dialect-speaking children listened to these sounds produced as contrasts by standard English speakers, they still heard them as homonyms, possibly because they themselves hear and say them as homonyms.

No significant group differences were found on the Homonym/Negro Dialect Speaker Items. All groups of subjects incorrectly judged more word pairs to be identical here than on any other part of the Auditory Discrimination Test. These results were not surprising because many of the word pair items were pronounced almost homonymically by the Negro dialect speakers.

No significant group differences were found on responses to the contrast items. It is interesting to note that the standard English-speaking children scored similarly on the contrast and homonym items. This indicated that both types of items were of equal difficulty for this group of children. If the Auditory Discrimination Test can be considered as a test of two parts (the Homonym Items and the Contrast Items), each part equally difficult for standard English-speaking children, the following question is relevant: why was the score of the Negro dialect-speaking children similar to that of the standard English-speaking children on one part of the test and significantly lower on the other part? It appears that the difference is not due to poorer auditory discrimination ability on the part of the Negro dialect-speaking children. If those youngsters were less able to discriminate among speech sounds than standard English speakers were, they would score significantly lower on <u>both parts</u> of the Auditory Discrimination Test. It can be reasoned, therefore, that their scores on the Auditory Discrimination

Test, in general, and on the Homonym/Standard English Speaker Items in particular, were highly related to the importance of these sounds in their own dialect.

While a rationale for these findings exists in the literature on speech (Prins, 1963; Weiner, 1967) there have been no similar explanations given in the literature dealing with auditory discrimination ability in disadvantaged and middle-class youngsters (Clark and Richards, 1966; Deutsch, C., 1964). Instead, the latter writings noted that inadequate development of auditory discrimination ability in disadvantaged children could be explained, in part, by their exposure to a restricted range of experience, to excessive amounts of noise and to a poor quality and limited quantity of meaningful speech.

It is clearly indicated that although exposure to Negro dialect speakers did not improve the performance of the Negro dialect-speaking children, exposure to standard English speakers did significantly improve the performance of combined groups of standard English-speaking children. It is felt that the unfamiliarity of the Negro dialect-speaking children with standard English is, in part, compensated for by the greater precision of articulation of standard English speakers. Similarly, it can be reasoned that the standard English-speaking children not only found the standard English speakers more familiar, but also more precise in pronunciation than the Negro dialect speakers. Therefore, these youngsters scored significantly higher with the former than with the latter.

Summary and Implications for Teaching Reading

Previous research has established a general positive relationship existing between speech pronunciation and auditory discrimination of speech sounds, and that listeners discriminate with greater accuracy within their own language than within a foreign tongue. The present study has shown that dialect differences within a single language are also positively related to differences in auditory discrimination performance. Thus, differences between the performance of Negro dialect-speaking and standard English-speaking children on an auditory discrimination test may, in part, be explained by the differences in their speech pronunciation.

The data indicate that Negro dialect-speaking children are not inferior to standard English-speaking children in general auditory discrimination ability. They experience particular difficulty only when discriminating among sounds homonymically pronounced in their own dialect, when these sounds are pronounced contrastingly by standard English speakers. Therefore, while teachers responsible for beginning reading instruction should be aware that Negro dialect-speaking children may have difficulty in discriminating among these particular sounds, they should not assume that the children are deficient in auditory discrimination ability.

The present study points up a need for further refinement of testing instruments so that children's abilities relating to school achievement may be more accurately assessed. For example, on a gross measure of auditory discrimination, it would appear that Negro dialect-speaking children were deficient in this ability. When the measure was somewhat narrowed to focus on the relationship of auditory discrimination and speech, it was found that children were not deficient but had special difficulty with certain sounds. Findings such as those reported above will help to identify more accurately the specific reading problems of disadvantaged Negro children and, hopefully, will make it possible to design more effective methods of reading instruction for them.

TABLE I

WORD PAIR ITEMS USED IN AUDITORY DISCRIMINATION TEST

CONTRAST ITEMS:	HOMONYM ITEMS:
chop-shop	mow-more
cap-cup	pass-past
mat-mate	law-low
pet-pit	den-then
met-net	not-night
van-fan	guard-god
beg-leg	scream-stream
deed-bead	lock-like
ax-ox	hear-hair
zoo-shoe	ten-tin

TABLE II

MEANS AND STANDARD DEVIATIONS OF AGE IN MONTHS, SCORES ON PEABODY PICTURE VOCABULARY TEST, STANFORD-BINET VOCABULARY TEST AND TOTAL SCORES ON THE AUDITORY DISCRIMINATION TEST FOR THREE GROUPS OF SUBJECTS

	GROUP I NEGRO DIALECT-SPEAKING N = 40		GROUP II NEGRO STANDARD ENGLISH-SPEAKING N = 40		GROUP III WHITE STANDARD ENGLISH-SPEAKING N = 40	
	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
AGE IN MONTHS	81	3.61	82	3.00	80	3.56
PEABODY PICTURE VOCABULARY TEST:						
RAW SCORE	57.92	7.37	59.90	5.50	65.05	7.49
MENTAL AGE	6-6		6-8		7-10	
STANFORD-BINET VOCABULARY TEST:						
RAW SCORE	6.68	2.41	7.35	2.12	8.38	1.93
AUDITORY DISCRIMINATION TEST:						
TOTAL SCORE:	23.70	6.01	25.38	5.94	27.42	4.60

TABLE III

THREE-WAY ANALYSIS OF VARIANCE ON TRANSFORMED SUBSCORES OF AUDITORY DISCRIMINATION TEST BY ITEM TYPE, SPEAKER AND GROUP (WINER, B.J., 1962)

SOURCE OF VARIATION	df	MEAN SQUARES	F
BETWEEN GROUPS	119		
Groups	2	1.78	4.45**
Subjects Within Groups	117	.40	
WITHIN GROUPS	360		
Speakers	1	5.29	96.18**
Groups & Speakers	2	.28	5.13**
Speakers & Subjects Within Groups	117	.06	
Items	1	3.71	38.63**
Groups and Items	2	.61	6.38**
Items & Subjects Within Groups	117	.10	
Speakers and Items	1	.14	2.25
Groups & Speakers & Items	2	.26	4.08*
Speakers and Subjects and Items Within Groups	117	.06	

* p < .05   ** p < .01

TABLE IV

ONE-WAY ANALYSIS OF COVARIANCE ON THE TRANSFORMED SUBSCORES OF THE HOMONYM/STANDARD ENGLISH ITEMS OF THE AUDITORY DISCRIMINATION TEST USING PEABODY PICTURE VOCABULARY TEST SCORES AS COVARIATE

SOURCE OF VARIATION	df	MEAN SQUARES	F
Between Groups	2	.58	4.13*
Within Groups	116	.14	

* $p < .05$

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Visual Sequential Memory in Good and Poor Readers

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Outgrowth of Study

Various studies by Birch and Belmont have indicated that among the difficulties poor readers encounter is a defect in integrating auditory-visual information, i.e., they cannot recognize that a series of dots and the same series of taps represent equivalent information. Blank and Bridger (1964, 1966) have pointed out that in this case the stimuli (auditory tape and visual dots) were in no way alike except in sharing a common number symbol. Blank and Bridger have found that verbal labeling aided the solution of such problems and suggest that retarded readers have a deficit in applying conceptual categories or verbal labels to stimuli. They point out that is the failure to apply words to physical stimuli is representative of retarded readers' general functioning, then this deficit may in part underlie their reading disability.

A number of developmental psychologists have also been interested in how children develop the process of using their internal language system in orienting and organizing their responses to the external world. Flavell (1970) has reported a number of studies in which children at earlier developmental stages often are unable to apply language cues, which they possess, to solve problems. When a set of objects was placed in front of the child and the E tapped some of the objects in a particular order, i.e. comb, flowers, owl, apple, took the object from the child's view for 15 seconds and reexposed them in a different order than

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originally seen, the child was asked to tap the objects in the same order as originally tapped by the examiner. In all cases it was found that the children could identify the object verbally; however, during the task it was observed that a number of children, although the label was available, failed to make use of this label. These children typically performed poorer than children who did verbalize as indicated by lip movements which E looked for or by self-report. Flavell has called this process in which children fail to use their internal language in problem-solving situations a "production deficiency."

The current experiment makes use of the methodology reported by Flavell. A set of meaningful stimuli-blocks with pictures of an owl, flowers, comb, apple, and moon and a set of non-meaningful stimuli derived from the work of Krauss and Gluckberg were used. The rationale for use of the two sets was that it appeared on the basis of studies by Blank and Bridger and Birch and Belmont that perhaps what really differentiates between good and poor readers is most clearly seen when the internal language system of the child has to organize unfamiliar material or material not easily integrated. In addition it was the E's feeling that the differentiation that the ITPA system makes between representational and automatic-sequential levels is often more in the mind of the test constructor than what children do with the material. ITPA assumes that automatic sequential tasks require no mediation or use of internal language system. It was our feeling that the second (nonmeaningful) task, rather than bypassing representational thinking, would actually assess the child's ability to make use of representational processes in more unique and complex solving situations.

The meaningful stimuli (owl, comb) were presented first, immediately followed by the nonmeaningful stimuli. An inquiry followed final presentation. The inquiry was designed to elicit: 1) How the child attempted to solve the problems, 2) Could he identify and correctly label the meaningful stimuli, and 3) Could he give names to the nonmeaningful stimuli. In addition, during administration the E looked for and recorded all lip movements.

The S's in the experiment were 27 3rd graders. Based on New York State reading scores there were 15 poor readers 25% and below and 17 good readers 70% and above. Since IQ's could not be administered, checks were run with principal, assistant principal, reading and speech teacher, and school psychologist to eliminate any children felt to be intellectually limited or emotionally disturbed. All children were seen individuallly.

The results are perhaps most easily understood in the context of how they answer a number of questions.

1) Is there a significant difference between good and poor readers when trying to recall a visual sequence of meaningful stimuli?

The answer ~~to~~ this is "no." Analyses of the results show that good readers do not do statistically (.05) better than poor readers on their recall scores.

2) Are there any differences between good and poor readers on how they attempted to recall meaningful visual sequences?

The answer is again "no." All S's showed clear indications of lip movements which indicated verbal rehearsal of the sequences tapped by the E.

3) Is there a difference in recall scores for good and poor readers on so-called nonmeaningful stimuli?

The answer is "yes." Good readers do significantly better. Even with this limited number of S's significance was at a p .02.

4) Are there differences between the two groups in how they approached the nonmeaningful stimuli?

The results from observation of lip movements showed a total absence of such movements, which were clearly seen on the meaningful trials. Inquiry produced interesting findings. When asked how they tried to remember a series, 35% (8 of 12) good readers reported making up names and trying to remember the order by remembering the names. In constr st, none (0 of 15) of the poor readers reported using this strategy. Rather, they attempted to use a visual orientation, i.e., either trying to remember what the designs looked like or trying to remember the positions of the blocks tapped. The probability of obtaining such differences--8 of 12 good readers verbalizing, 4 visualizing and 0 of 15 poor readers verbalizing and 15 visualizing--is less than .001.

5) Now let us take this analysis in additional step. Within the good readers are there any differences in recall of nonmeaningful material between those good readers who reported verbalizing and those reporting visualizing? Again, the answer is "yes." Good readers who report verbalizing do significantly p .05 better on recall of nonmeaningful sequences than those reporting a visual approach.

Interpretation

Perhaps the most outstanding factor of the research is the relative clarity of differences in problem solving strategy used by most good readers when confronted with the nonmeaningful stimuli. The "Good" reader generally made an active attempt to organize the visual stimuli into an existing cognitive system which would allow the material to be most easily coded and stored for recall. The ability to code and store material sequentially is obviously a critical skill for reading comprehension which often requires the making of inferences based on sequentially related events. The ability to develop a strategy which maintains the order of such events is critical to good reading.

Of particular relevance is a report by Blank and Bridger (1966) which closely parallels the findings in this study. They reported that 9 of 13 good readers spontaneously labeled when working on dot patterns (approximately 75 as in this study), again as found in this study. Blank and Bridger found that not one poor reader displayed this verbal labeling strategy. Their conclusion, which also fits the present data, was that since the conversion of a group of letters into symbols (words) is a basic part of the reading process and since the failure in applying words or the use of a verbal strategy to visual stimuli is representative of the retarded readers' general functioning, then this deficit may in part underlie their reading disability.

This is not to implie that a basic deficit in sensory processes (auditory or perceptual) does not exist in retarded readers; however, in assessing such deficits, one must keep in mind differences in problem solving strategy which may affect testing such processes. In addition, there is the possibility that Benton (1962) has raised, that basic sensory defects predominate in young, poor readers, but conceptual deficits play an increasingly important role in older nonreaders.

With respect to intervention it is suggested that increasing time be spent on working with the basic strategy the poor reader uses in approaching reading. Working on modifying perceptual, auditory, and perceptual-motor deficits are futile if the child fails to integrate these attack skills into his reading approach. We have all worked with children who use these skills when closely monitored but drop them when left alone. This is consistent with findings from other studies which find that developmentally immature organisms do not show carryover when induced to verbalize. We need more and closer follow up on basic strategy in working with poor readers.

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Audio-Visual Integration - Dr. T. O. Thomas
1.

The concept of integration otherwise referred to as inter model transfer or intersensory processes has been the subject of relatively few studies. Generally, the literature supports the postulate that intersensory integration does occur. (Lindsay, Taylor and Forbes, 1968; Kalil and Freedman,1967). Evidence from the psychology of learning (Maier and Schneiria,1942; Birch and Bitterman,1949,1951) and neurophysiology (Sherrington,1951; Voronin and Guselnikov,1963) also supports the idea that the human organism integrates information from the different sense receptors.

Other studies are more cautious regarding intersensory processes. Rather than saying that sensory data is integrated in a complimentary manner, the positinn is taken that the senses are correlated or interact in some way. (Frieman,1967; Thornton, 1967). Some studies question whether or not there is a process such as integration (Buketinca,1968; Owen and Brown,1966; Fisher,1968).

Although questions have been raised, current thinking seems to favor the idea that there is integration of the sensory processes or some liaison between the senses. Concensus further indicates that integration appears crucial to many functions of the organism, particularly the language functions of reading and writing (Rabinovitch,et al, 1954; Berry,1968; Dinnerstein,1968 and Birch,1962).

One liability involved in integration that appears to be imperative to the skills of reading and printed spelling is what Johnson and Myklebust (1967) called reauditorization. The sounds that have been associated with the visual symbols must be recalled or remembered before the reader can utter them. What, then, is the nature of memory? Sperling (1963) spoke of the structure of memory and postulated that material is stored in memory in the form of verbal coding. On the basis of earlier studies (Sperling,1960; Averbush and Sperling,1961) Sperling suggested that the after image of visual material remains only one or two seconds, during which time it must be

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recorded verbally and rehearsed or it will not be available for recall. Mackworth (1963) found a distinction between the visual image and what is referred to as memory. In his study the duration of the visual image was about two seconds. Mackworth took the position that any information recalled after two seconds is the result of recognition or labeling process. This labeling process, said Mackworth, is a "translation into a more durable form, often verbal". Thus, it appears that a major componont of memory is auditory or verbal coding. This coding system of sound symbols seems to be the "microfilm" of the brain; for storing things in memory. The content of the sensory system (visual, auditory, tactile kinesthetic, etc.) appears to be coded verbally, rehearsed, and stored, all of which may or may not be audible to another person.

The problem in translating letters into sounds (reading) or sounds into letters (writing), it would seem, is that the individual is required to associate and integrate things that do not naturally and phenomenologically go together.

Though symbols have been derived from man's experiences, to a beginning reader there is no obvious relationship between the shape of the letters and the sounds for which they stand. Symbols seem arbitrarily assigned to sounds without any knowledge of why a sound and it's visual symbol have become associated. It is possible, then, that a child who cannot read is having difficulty developing associations instead of integrating. The question then becomes, "Is the child not able to recall the correct sounds, or is he unable to associate the appropriate visual symbol with the sounds"? If sound or auditory verbal symbols are important to integration, the question becomes, "Can he recall sound? Does the child have auditory memory"?

Obviously, what is needed is a way to bypass or reduce as much as possible the influence of the intervening variable of association. The important question is, "Can the child voluntarily ideate the sound silently and internally"? In other words, can he recall or generate the sound? What is needed are visual symbols that are naturally and phenomenologically related to the sounds they represent. The idea that the phenomenologies of sight and sound are related received support from Wicker (1968) when he reported that his subjects experienced visual and auditory phenomena (pitch-brightness and loudness-contrast) that were related in a systematic way. The need is for visual and auditory stimuli that are experientially equivalent. Over three decades ago, Kleuver (1936) was in search of a solution to this problem when he described what he called the "Method of Equivalence".

Ford (1965) used an extension of Kleuvers method with two modifications and found auditory-visual integration to be related to I.Q. and reading achievement. Birch and Lefford (1963) and later Birch and Belmont (1965a) adapted the method. The equivalence studies mentioned above used the one dimension of shythm or duration. In Birch and Belmont studies (1965a,1965b) (Figure 1) the experimenter tapped a sound pattern and then showed the child equivalent visual patterns. The task was to choose the visual pattern that matched the sound pattern. In the present study the writer proposed three modifications: 1) the use of a bidimensional approach involving both rhythm and pitch Figure 2 the use of recall instead of recognition and 3) the measure of the child's ability in both directional sequences - Visual to Auditory and Auditory to Visual. The high correlation between measured I.Q. culture (middle class-lower class) and school achievement is well known. Thus, any study related to these variables would have to take them into account. If the ability to recall sounds or develop acoustic images is critical to integration, and the above measures, in some way, reflect the processes of auditory recall and integration, it was expected that there would be a significant difference in word recognition and printed spelling:

- between Ss who score high on the integration measure and those who score low (Upper and lower quartile)
- between Ss from middle class culture and those from lower class culture
- between S_s with a "high" I.Q. and those with a "low" I.Q. (High I.Q. = 105-115; low I.Q. =85-95)

It was further expected that there would be a significant interaction between:

- Integration and Social Class
- Integration and I.Q.
- Social Class and I.Q.
- Integration, Social Class and I.Q.

The sample for this study was composed of Anglo-American boys from surrounding school districts. Forty-five Ss performed the Visual-Auditory task and forty-nine performed the Auditory-Visual task. Their ages ranged from 7-0 to 8-0. This age was chosen because Birch and Belmont (1965) stated that integration functions in the child are about 90% matured by the beginning of the seventh year. It was decided that male Ss should be used in order to prevent introduction of variables other than those absolutely necessary in what was considered exploratory study. Originally, Social Class was defined, using criteria suggested by Bergel (1962). However, it was soon evident that in the greater Houston area there were few, if any, Anglo-American boys from homes with low enough income. Since the functions measured have been shown to be subject to influence of culture it was felt that the only alternative was to find Anglo boys from families with minimal income and apparant deprivation.

Ss had intelligence quotients within one standard deviation of the mean for the normal range 85 to 115 as measured by the Slosson Intelligence Test administered at the time of this study. In addition, Ss were screened for eye-hand coordination by having them draw the Bender designs. To test their auditory perception they were asked to distinguish between high and low sounds produced on a slide tonette.

Groups were dichotomized into high and low integration (H_I-L_I) middle and lower-class (M_C-L_C) and high and low intelligence (H_Q-L_Q). This yielded eight cells or groups for each half of the study as indicated by Figure 3.

There were two criterion measures. Reading (Word Recognition) was the dependent variable for the Visual-Auditory half of the study and Printed Spelling was the dependent variable for the Auditory-Visual task. The reading words were taken from the Wide Range Achievement Test (Jastak, et al,1965) Level 1. The spelling words were from the Durell Analysis of Reading Difficulties (Durrell) (1965) spelling test, phonetic spelling words and visual memory of words, primary level.

The range of difficulty for both dependent measures were from the first through the fourth grades.

The Ss were presented two integrative tasks. The first task involved twenty (20) visual patterns, similar to those in Figure 2, each one printed in black on a separate blank white card. Two positions on the cards were always used in various combinations to make the visual patterns. High tones were represented by lines at the top of the cards and low tones were represented by lines at the bottom of the card. The cards were presented to each subject, one at a time. The Ss were provided with a slide tonette and asked to produce auditory patterns which matched what they saw. The second task consisted of twenty (20) auditory patterns which were the equivalent to the visual patterns illustrated in Figure 2. These were recorded and played on a Cassette tape recorder. The auditory patterns were presented to each S one at a time. The Ss were asked to draw visual patterns which matched what they heard.

A summary of the results on reading is presented in Table 1.

The results on printed spelling are presented in Table 11.

The results from analysis of the data give evidence that high integrators were able to recognize and spell significantly more words than low integrators. This was not unexpected since most studies comparing groups on integrative tasks have obtained similar results. However, most of the research in the literature involved the unidimensional task of rhythm, without considering pitch, and required recognition rather than recall. This finding indicated that integrative ability as defined and measured in this study is a critical factor in word recognition and spelling regardless of social class or level of normal intelligence.

The result indicating that Ss with high intelligence recognized and spelled significantly more words than did Ss with low intelligence was anticipated. This outcome agrees with the literature and indicates that intelligence is a critical factor in word recognition and spelling regardless of integrative ability or social class.

It is possible that integration as defined and measured in this study is an integral part of intelligence and the two constructs overlap considerably. There is some support for this since the interactions of integration with intelligence was not significant. If this is the case, the same or very similar abilities were measured in both instances. This would suggest that once the separate effects of these two variables had been removed, the residual effect of their being combined would be minimal.

Results from the interaction of Social Class and Intelligence show that their combined influence on Printed Spelling was significant. (Figure 18,Page 19). Performance of the groups involved indicate that the difference was greatest between Middle Class Ss from the two levels of intelligence. t tests performed to test the significance of this result and to identify the groups which accounted for the difference indicate that the difference was in favor of Middle Class Ss with high intelligence. This was not a surprise since the literature indicates that, all other things being equal, these qualities are assets in spelling.

From the findings it may be concluded that regardless of Social Class or intelligence, high integrators recognized and spelled more words than did low integrators. However, it cannot be consluded that Integration along is the sole determinant of word recognition ability since those Ss with high intelligence also performed significantly better than did those with low intelligence. The lack of a significant interaction between those two main effects indicates that high integrators with low normal intelligence and Ss with high intelligence who were low integrators did well enough on Word Recognition and Spelling that their strength in one area compensated for their weakness in the other. The conclusion here is not that integration as defined and measured in this study is as broad a concept as intelligence. The integrative task was kept at the level of simple phenomenon and the dependent measure was much too narrow and specific to provide adequate ceiling and breadth for measuring intelligence.

The purpose of this study was to investigate the role of Auditory Recall in integrative tasks. As in all experiments, the design was to evaluate and control all other relevant variables. This was done so that any differentiation between Ss would be attributable to their Auditory Recall ability as inferred from their integrative ability. From the results it might be inferred that Auditory Recall is critical to Word Recognition and Spelling and the measurement and development of this skill should be beneficial to children.

FIGURE 1

Examples of the Single Dimension Patterns Used in Equivalence Studies Involving Rhythm Only

<u>Stimulus</u>
(Sound patterns: taps)

<u>Response</u>
(Selection of Equivalent Visual Pattern)

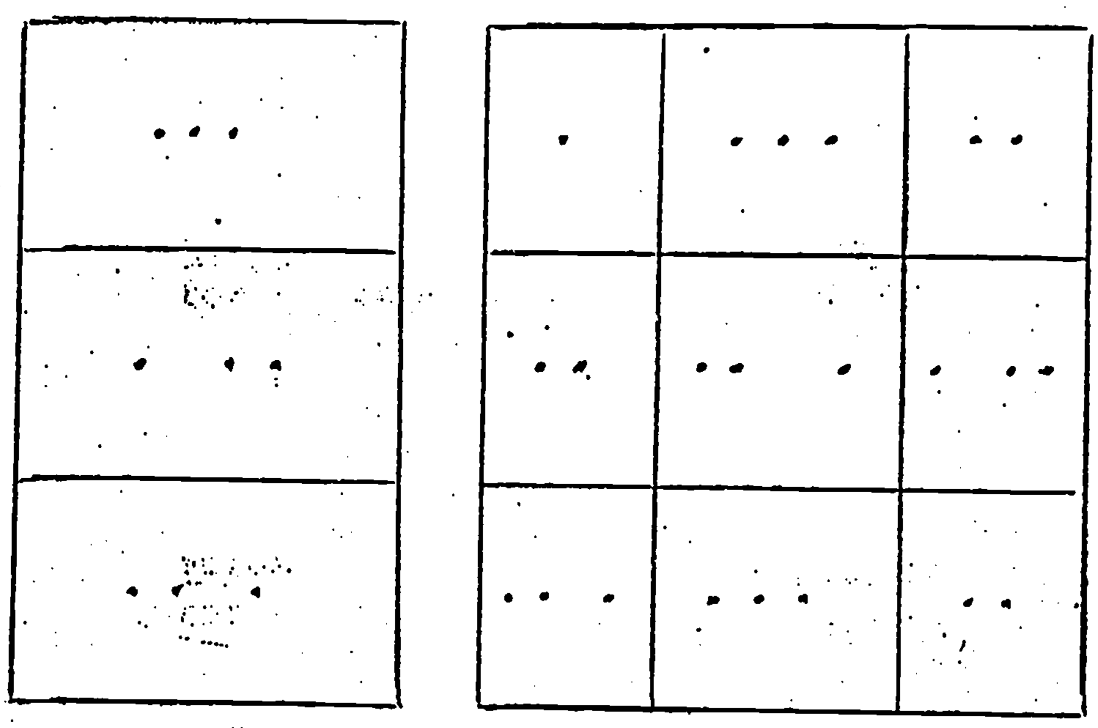

FIGURE 2

Examples of the bidimensional Patterns Using Both Rhythm and Pitch

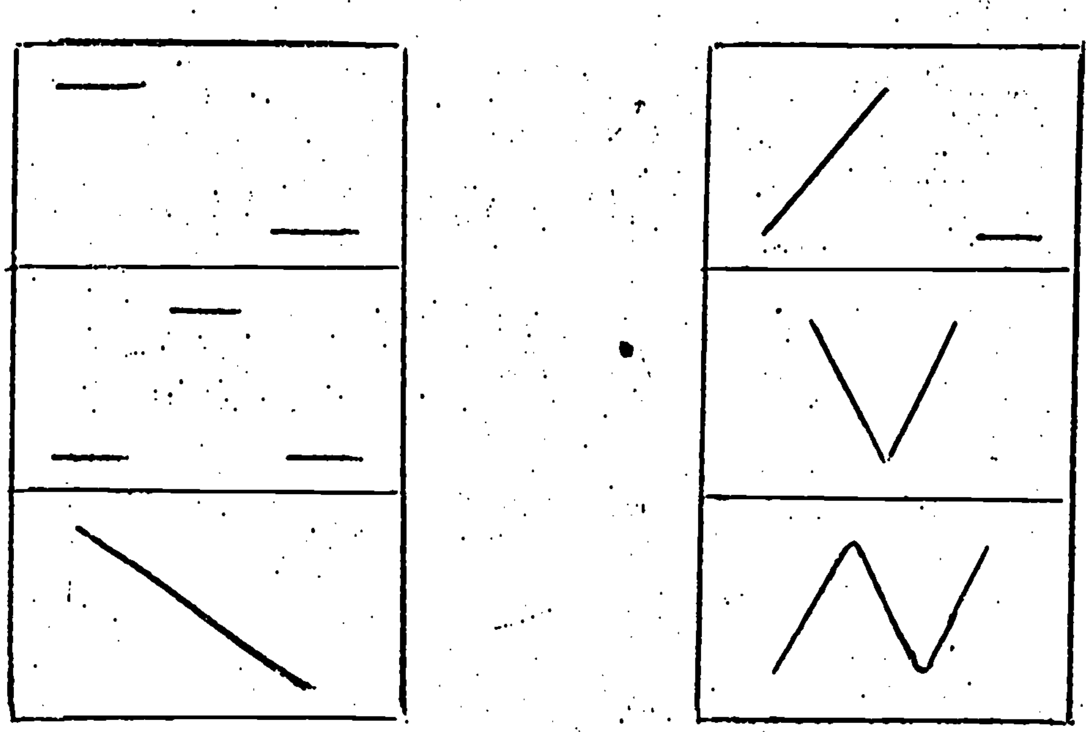

FIGURE 3

Experimental Design

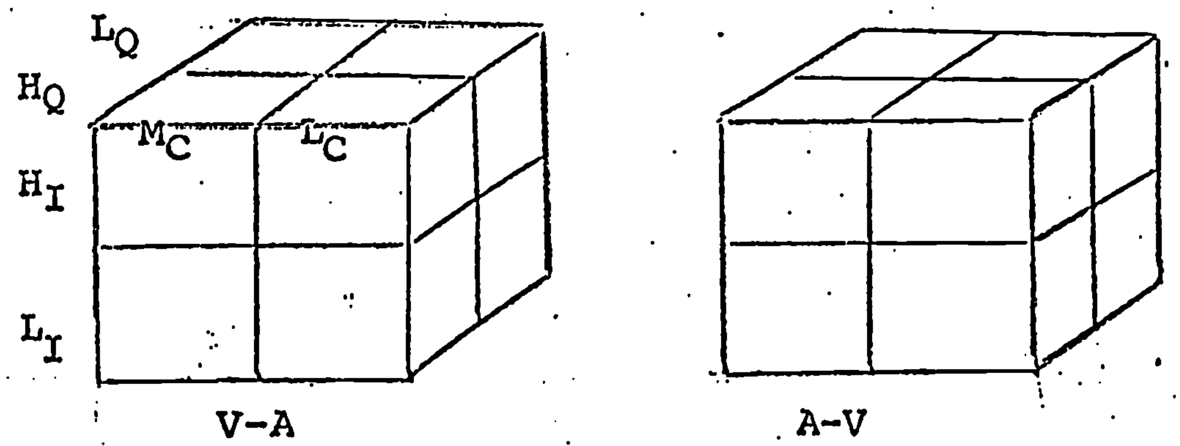

TABLE I

Word Recognition

Source	SS	df	ms	F	P
Total	4054	44	--	--	--
Integration	796	1	796	15.02	.001
Social Class	27	1	27	.50	NS
Intelligence	847	1	847	15.99	.001
Integ. X Social Class	53	1	53	1.00	NS
Integ. X Intelligence	1	1	1	.01	NS
Social Class X Intell.	193	1	193	3.64	(.10)
Integ. X Soc. Cl. X Int.	188	1	188	3.55	(.10)
Error	1949	37	53	--	--

TABLE II

Printed Spelling

Source	SS	df	ms	F	P
Total	5126	48	--	--	--
Integration	1637	1	1637	29.23	.001
Social Class	49	1	49	..88	NS
Intelligence	378	1	378	6.75	.025
Integ. X Social Class	217	1	217	3.87	(.10)
Integ. X Intelligence	90	1	90	1.61	NS
Social Class X Intell.	230	1	230	4.11	.05
Integ. X Soc. Cl. X Int.	211	1	211	3.79	(.10)
Error	2314	41	56	- -	- -